

SnapManager® 3.1 *for Microsoft® Exchange* **Installation and Administration Guide**

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Preface

About this guide

This guide describes how to install and configure SnapManager® 3.1 for Microsoft® Exchange software and use its online backup and restore features. It also describes how to use SnapMirror® functionality with SnapManager.

This guide does not explain how to install, configure, and use the SnapDrive™ features that enable you to create and connect to LUNs, which you must do before you use SnapManager. For this information and details about how to configure filer volumes and enable filer access, see your SnapDrive documentation.

This guide does not cover basic system or network administration topics, such as IP addressing, routing, and other network topology.

Audience

This guide is for system and database administrators with a working knowledge of Microsoft Exchange. The discussion assumes familiarity with the following topics:

- ◆ Microsoft Exchange server administration
- ◆ Network functions and operations
- ◆ Basic concepts for moving data over a network
- ◆ Your operating system, network, and Network Appliance™ storage appliance, such as a filer
- ◆ CIFS protocols, as used for file sharing and file transfers
- ◆ FCP and iSCSI LUN access protocols

Typographic conventions

The following table describes the typographic conventions used in this guide.

Convention	Type of information
<i>Italic type</i>	Words or characters that require special attention. Placeholders for information you must supply. For example, if the guide says to enter the <code>arp -d hostname</code> command, you enter the characters “arp -d” followed by the actual name of the host. Book titles in cross-references.

Convention	Type of information
Monospaced font	Command and daemon names. Information displayed on the system console or other computer monitors. The contents of files. Formulae and calculations.
Bold monospaced font	Words or characters you type. What you type is always shown in lowercase letters, unless you must type it in uppercase letters.

Special messages

This guide contains special messages that appear in the following circumstances:

Note

A note provides important information to help you install or operate your system efficiently.

Caution

A caution contains instructions that keep you from damaging equipment, crashing your system, or losing data.

About this chapter This chapter explains how SnapManager 3.1 for Microsoft Exchange works, and how it integrates with the rest of your environment.

Topics in this chapter This chapter discusses the following topics:

- ◆ “[SnapManager overview](#)” on page 2
- ◆ “[How SnapManager works with other system components](#)” on page 5
- ◆ “[How SnapManager works with other backup methods](#)” on page 12

SnapManager overview

New functionality for this version

SnapManager 3.1 for Microsoft Exchange enables the following new features and capabilities:

- ◆ Support for Microsoft Exchange 5.5 on Microsoft Windows® 2000 Server
For more information about using this document with Microsoft Exchange 5.5, see “[Using this document with Exchange 5.5](#)” on page 2.
- ◆ Support for Microsoft Windows Server 2003 Standard Edition
- ◆ Transaction log verification (Exchange 2000 or 2003 only)

Using this document with Exchange 5.5

You can use this document with all versions of Exchange supported by SnapManager 3.1 for Microsoft Exchange, including Exchange 5.5. Information specific to certain versions of Exchange is noted accordingly. Because the storage terminology used by Exchange 5.5 is slightly different than for Exchange 2000/2003, many of the procedures have their own version for Exchange 5.5.

Exchange 5.5 users might not be familiar with the term *storage group*. Storage groups were introduced in Exchange 2000; they are used to contain up to five databases, with the corresponding set of transaction logs, so that you can manage the databases as a single entity.

If you are using Exchange 5.5, when you see “storage group” in this document, think of your Information Store (IS) or your Directory Store (DS). You can perform the same operations on the IS and DS as you can on storage groups in Exchange 2000.

Note

SnapManager 3.1 for Microsoft Exchange does not support NT 4.0; if you are running Exchange 5.5, your Exchange servers must be running Windows 2000.

What SnapManager does

SnapManager for Exchange provides an integrated data management solution for Exchange that dramatically boosts the availability, scalability, and reliability of Microsoft Exchange.

SnapManager provides rapid hot backup and restoration of Exchange databases by using online Snapshot™ technology from NetApp and integrating the Microsoft Exchange backup and restore APIs and VSS. SnapManager can also leverage the SnapMirror capabilities of NetApp® filers to provide on-site or off-site SnapManager backup set mirroring for disaster recovery.

SnapManager supports the following data management capabilities:

- ◆ Migrate the Exchange databases and transaction logs to LUNs
- ◆ Back up the Exchange databases and transaction logs from LUNs
- ◆ Verify the backed-up Exchange databases
- ◆ Verify the backed-up transaction logs (Exchange 2000 or 2003 only)
- ◆ Manage the SnapManager backups
- ◆ Restore the Exchange databases and transaction logs from previously created SnapManager backups
- ◆ Archive backups for long term or remote backup storage
- ◆ Mirror for disaster recovery (with SnapMirror)

SnapManager components and functionality

SnapManager includes the following components.

Component	Description
SnapManager Configuration Wizard	SnapManager Configuration Wizard ensures that Exchange data is placed correctly for SnapManager. It dismounts the databases in an Exchange storage group and moves the database and transaction log files from the Exchange server to the selected LUNs. It then remounts the databases and creates a SnapInfo directory for storing information about backed-up data sets and transaction logs. For more information, see “Understanding the SnapManager Configuration Wizard” on page 68.
SnapManager Backup	SnapManager Backup enables you to perform and schedule frequent, automatic online full backups. The application performs these backups by creating snapshots of the Exchange databases and transaction log files. For more information, see “Understanding SnapManager Backup” on page 84.

Component	Description
SnapManager Restore	SnapManager enables rapid recovery of an Exchange storage group or database. The SnapManager Restore wizard enables you to select a particular backup to restore, restore your Exchange database state using that backup, and then recover the database to its current state by replaying the transaction logs. For more information, see “Understanding SnapManager Restore” on page 130.

How you use SnapManager

You can run SnapManager on your Exchange server or on a different computer. When you run SnapManager on a different computer, it is called SnapManager remote administration. Using a SnapManager remote administration system, you can perform any task you can on a locally installed SnapManager system. When you perform database verification from your remote administration system, it is referred to as remote verification.

The following steps describe a typical way to use SnapManager:

- ◆ After installing SnapManager, you use SnapManager Configuration Wizard to dismount your Exchange databases and move them to LUNs on a NetApp storage appliance. The Configuration Wizard ensures that your Exchange data is placed correctly.
- ◆ After you configure the Exchange data store, you can use SnapManager Backup to create backups of the Exchange data.
- ◆ If the need arises, you can use SnapManager Restore to restore your Exchange data (either entire storage groups or individual databases) from one of the backups.
- ◆ Using SnapManager’s backup facility to initiate SnapMirror through SnapDrive, you can create mirror replications of these databases to be used for various purposes, such as disaster recovery.

How SnapManager works with other system components

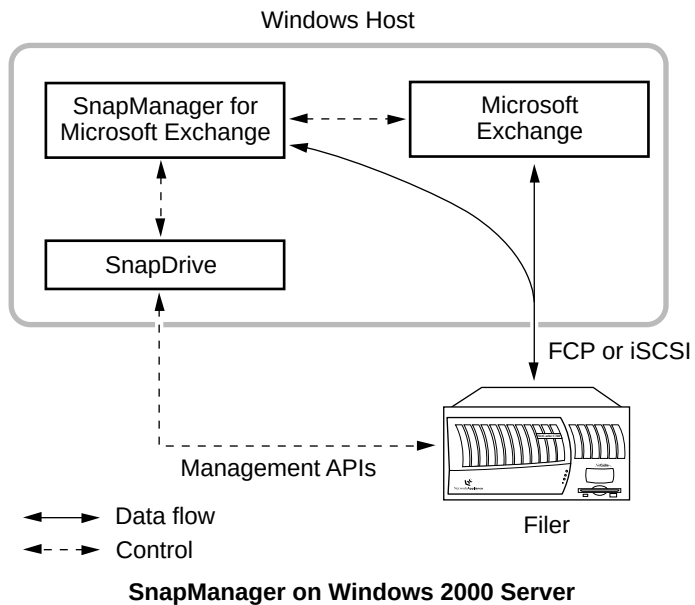
About this section

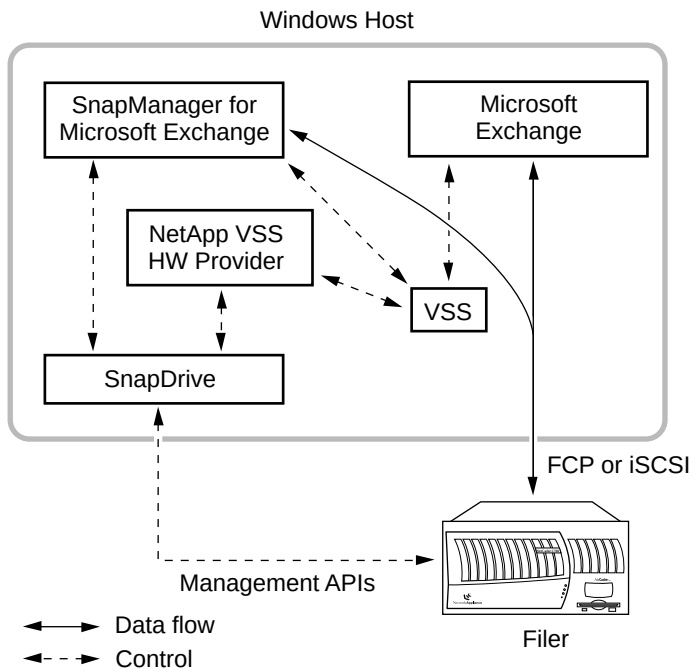
This section details how SnapManager works with the following system components:

- ◆ SnapDrive
 - For details, see “[SnapManager and SnapDrive](#)” on page 7.
- ◆ VSS
 - For details, see “[SnapManager and VSS](#)” on page 8.
- ◆ Snapshots
 - For details, see “[SnapManager and snapshots](#)” on page 9.

System overview

The following diagrams show how SnapManager interacts with other components of an Exchange installation backed by a NetApp filer, for the Windows 2000 Server and Windows Server 2003 environments.





SnapManager on Windows Server 2003

SnapManager and SnapDrive

How SnapManager and SnapDrive work together

SnapManager is an Exchange-aware application that uses the Exchange backup APIs (for Exchange servers running Windows 2000 Server) or VSS (for Exchange servers running Windows Server 2003) to provide backup and restore functionality in an Exchange environment.

SnapDrive integrates with the NTFS Windows file system, Windows Volume Manager, and LUNs to enable the management of storage resources on the filer in the Windows environment. SnapDrive provides the underlying layer of support for SnapManager.

When to use SnapManager and when to use SnapDrive

You use SnapManager for all backups and related operations. For example, you use SnapManager to establish your Exchange databases on LUNs on a filer and to back up and restore LUNs on the filer.

You use SnapDrive only to create and manage the LUNs and filer volumes that contain your Exchange data and to perform supplemental mirror updates of the transaction log volume when SnapMirror is used.

SnapManager and VSS

What VSS is

Microsoft Volume Shadow Copy Service (VSS) is a new feature of Microsoft Windows Server 2003 that coordinates between data servers, backup applications, and storage management software to support the creation and management of consistent shadow copies, or snapshots. For more information about VSS, see your NetApp VSS Hardware Provider documentation.

How SnapManager uses VSS

In the Windows Server 2003 environment, SnapManager is a VSS requestor, which means that it uses the VSS subsystem to initiate backups.

How you manage VSS snapshots created by SnapManager

Although SnapManager uses VSS to create snapshots, you manage the resulting snapshots using SnapManager or SnapDrive. You cannot use the VSS administration tool `vssdamin` to manage snapshots created by SnapManager.

NetApp VSS Hardware Provider requirement

Because SnapManager uses VSS to create snapshots on the filer in the Windows Server 2003 environment, you must have the NetApp VSS Hardware Provider installed for SnapManager to function properly. For more information about the NetApp VSS Hardware Provider, see your NetApp VSS Hardware Provider documentation.

SnapManager and snapshots

About SnapManager and snapshots

A snapshot is a point-in-time, read-only copy of a LUN stored on a filer volume. SnapManager Backup uses snapshot functionality to create real-time, online, read-only copies of Exchange databases. A SnapManager backup can consist of several snapshots, depending on how your Exchange data is configured.

Note

You must always use SnapManager to manage SnapManager backups, rather than managing the associated filer snapshots using SnapDrive, VSS, or filer administration tools, such as the FilerView® interface.

When to use the different snapshot and backup methods

There are multiple ways to take snapshots or backups in an Exchange installation that includes SnapManager. It is important to understand when each of these methods can produce a restorable image and when they cannot.

When one or more Exchange databases are mounted, snapshot-based backups should be performed using only SnapManager. Taking a snapshot of the Exchange databases from the filer console, FilerView, SnapDrive, or a non-Exchange-aware Windows backup utility results in an inconsistent image of the Exchange database that is unusable for a restore.

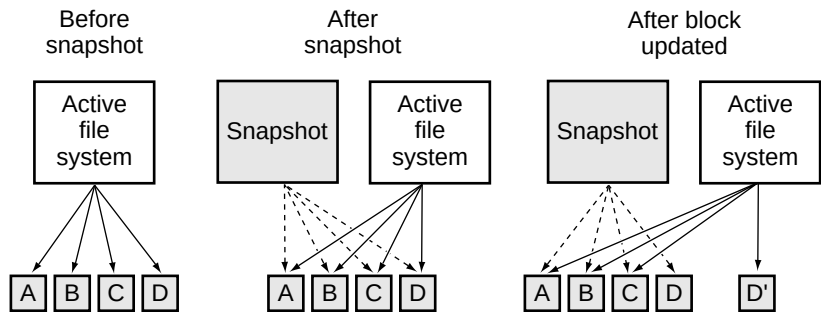
The following table illustrates when each of the snapshot or backup methods can create restorable backups.

Tool used to create snapshot or backup	System state		
	Exchange online	All Exchange dbs dismounted	All LUNs disconnected
SnapManager Backup	OK	N/A	N/A
SnapDrive	invalid	OK	N/A
Exchange-aware Windows backup utility	OK (copy backup only)	N/A	N/A

Tool used to create snapshot or backup	System state		
	Exchange online	All Exchange dbs dismounted	All LUNs disconnected
Non-Exchange-aware backup utility	invalid	OK (copy backup only)	N/A
Filer tools	invalid	invalid	OK

Understanding snapshots

The following figure provides an example of how snapshots work.



Example: Suppose you take a snapshot of a file named file.txt that spans four disk blocks in the active file system. Initially, the snapshot version of file.txt and the version in the active file system are identical: the same blocks on disk store both versions, so the snapshot version of file.txt consumes no additional disk space.

Now suppose that you make a modification to file.txt that affects only one of the four disk blocks. The new data cannot overwrite the original block because that block is needed as part of the snapshot. So the new data is written to a new disk block and the file's inodes are updated accordingly. The active file system inodes now reference the three original disk blocks that have not been touched since the snapshot, plus the one new block. The snapshot inodes still reference the original four blocks.

If you delete file.txt, the blocks holding its data are no longer part of the active file system, but they are still part of the snapshot; deleting file.txt from the active file system does not free any disk space until the snapshot is deleted.

**Maximum number
of snapshots you
can retain**

Data ONTAP™ software allows a maximum of 255 snapshots per filer volume. Because SnapManager backups create snapshots, you must delete old SnapManager backups as they are no longer needed to avoid reaching the limit.

Note

The number of snapshots on a volume can be greater than the number of SnapManager backups being retained. For example, if a single volume contains both the SnapInfo directory and the Exchange databases, each SnapManager backup generates two snapshots on that volume.

How SnapManager works with other backup methods

SnapManager and your current backup processes

SnapManager complements conventional backup processes. For example, SnapManager backups reside on disk. To archive SnapManager backups to another storage medium, such as tape, you use the same tools and processes you currently employ.

However, some backup processes interfere with SnapManager’s ability to back up and restore correctly. It is important that you understand which of your current backup tools and processes must be modified or eliminated when you implement SnapManager.

SnapManager backups are not intended to replace periodic disaster recovery measures, such as archiving to tape or other offline media.

Type of external backup to use with SnapManager

Exchange-aware backup tools (such as NTBackup) can create backups of different types. Generally, SnapManager backups replace these backups. However, if you need to create a backup using an Exchange-aware backup tool on a system with SnapManager installed, you must use only a copy or differential backup.

Caution _____
Using an Exchange backup tool to create a backup of a type other than copy or differential after you implement SnapManager causes your previously created SnapManager backups to become unusable for up-to-the-minute restores.

The following table describes the backup types.

Backup type	Description	Result
Copy	Backs up all selected files; does not clear archive bit	OK SnapManager backups unaffected

Backup type	Description	Result
Normal (full)	Backs up all selected files and clears archive bit	DO NOT USE Truncates transaction logs; disables SnapManager up-to-the-minute restores
Differential	Backs up all selected files with archive bit set	OK SnapManager backups unaffected
Incremental	Backs up all selected files with archive bit set and clears archive bit	DO NOT USE Truncates transaction logs; disables SnapManager up-to-the-minute restores

Exchange files that should be backed up using a Windows backup utility

SnapManager does not back up all the files commonly used by an Exchange server. You should use a standard Windows backup utility, such as NTBackup, to back up the following items:

- ◆ File systems on hard disks connected to the Exchange server
- ◆ Windows registry
- ◆ Windows Active Directory
- ◆ Internet Information Service (IIS) metabase
- ◆ Key Management Service (KMS) database
- ◆ Site Replication Services (SRS) database
- ◆ System state

Note

You can use NTBackup to back up to a file, instead of using tape, and write or store that file directly on a filer.

About this chapter

This chapter describes tasks you need to perform before installing SnapManager 3.1 for Microsoft Exchange or upgrading from a previous version.

Preinstall or preupgrade process

Before you begin installing or upgrading SnapManager, you must complete the following tasks.

Task	Process
1	Verify your system requirements. For details, see “ Verifying system requirements ” on page 18.
2	Back up system resources and databases. For details, see “ Backing up system resources and data ” on page 22.
3	Determine how many LUNs you need for your SnapManager installation and what data those LUNs will hold. For details, see “ Planning your Exchange storage requirements ” on page 23. Note _____ Even if you are upgrading a functioning SnapManager system, you might need to add extra LUNs to take advantage of the individual database restore feature. For more information about converting your existing SnapManager system to use individual database restore, see “ Considerations for converting to individual database restoration ” on page 25.
4	Calculate the required sizes for the LUNs and volumes to complete your SnapManager data configuration plan. For details, see “ Sample SnapManager configurations ” on page 32.
5	Use the results of Step 3 and Step 4 to create your SnapManager data configuration plan. For details, see “ Creating the SnapManager data configuration plan ” on page 43.

Task	Process	
6	Configure or upgrade your filer according to the requirements for SnapDrive. For information about configuring your filer for SnapDrive, see your SnapDrive documentation.	
7	Configure or upgrade your Windows system for SnapDrive and Exchange. For details, see your SnapDrive documentation and your Microsoft Windows documentation.	
8	Install or upgrade SnapDrive. For information about installing or upgrading Snapdrive, see your SnapDrive documentation. Note_____ If you are installing SnapManager for remote administration only (no verification), you do not need to install SnapDrive. _____	
9	If...	Then...
	You are installing SnapManager for Microsoft Exchange	Using your filer administration tools and SnapDrive, create the required volumes outlined in the SnapManager data configuration plan you created in Step 5 .
	You are upgrading SnapManager for Microsoft Exchange	Review your volumes and LUNs against the requirements in the SnapManager data configuration plan you created in Step 5 . Use your filer administration tools and SnapDrive to make any necessary changes.
10	For host systems running Windows Server 2003, install NetApp VSS Hardware Provider. For details, see the <i>NetApp VSS Hardware Provider Installation and Administration Guide</i>.	

Task	Process
11	After you complete these tasks, you are ready to install or upgrade SnapManager. Proceed to “ Installing or Upgrading SnapManager ” on page 45.

Verifying system requirements

System requirements

Use the following table to determine the system requirements for SnapManager 3.1 for Microsoft Exchange.

Note

For the most current list of system requirements, see the SnapManager 3.1 for Microsoft Exchange Product Description Page on the NetApp on the Web (NOW) site at <http://now.netapp.com/NOW/cgi-bin/software/>.

For information about compatible versions of SnapManager, SnapDrive, and Data ONTAP, see the SnapManager and SnapDrive Qualification Matrix on the NOW site at http://now.netapp.com/NOW/knowledge/docs/olio/guides/snapmanager_snapdrive_compatibility.

For information about the system requirements for remote administration, see “[Remote administration system requirements](#)” on page 20.

Host system requirement	Windows 2000 Server	Windows Server 2003
Data ONTAP	See the SnapDrive system requirements.	See the SnapDrive and NetApp VSS Hardware Provider 1.0 system requirements.
SnapDrive	3.0R2	3.0R2
NetApp VSS Hardware Provider	N/A	1.0

Host system requirement	Windows 2000 Server	Windows Server 2003
Microsoft Exchange	◆ Exchange 2003 with SP1 (Standard or Enterprise Edition) ◆ Exchange 2003 (Standard or Enterprise Edition) ◆ Exchange 2000 with SP3 (Standard or Enterprise Edition) ◆ Exchange 5.5 with SP4 (Standard or Enterprise Edition)	◆ Exchange 2003 with SP1 (Standard or Enterprise Edition) ◆ Exchange 2003 (Standard or Enterprise Edition)
Host operating system	◆ Windows 2000 Server with SP4 ◆ Advanced Server with SP4	◆ Windows Server 2003 (Standard or Enterprise Edition)
Other host system requirements	The host system used to run SnapManager 3.1 for Microsoft Exchange must meet the hardware and software system requirements for these required software applications: ◆ SnapDrive ◆ NetApp VSS Hardware Provider See the product description pages for these products for complete details about the following system requirements: ◆ Hotfixes ◆ Host hardware platform ◆ LUN access protocol software	

Remote administration system requirements

If you are installing SnapManager for remote administration only (no verifications will be performed on this machine), use the system requirements listed in the following table.

Host system requirement	Windows 2000 Server	Windows Server 2003
Host operating system	◆ Windows 2000 Server with SP4 ◆ Advanced Server with SP4	◆ Windows Server 2003 (Standard or Enterprise Edition)

SnapManager license options

You can license SnapManager 3.1 for Microsoft Exchange per Exchange server or on the filer.

Per-server licensing: This license is for a specific Exchange server. When you use per-server licensing, no SnapManager license is required on the filer.

Filer licensing: If no server license is detected, SnapManager checks the filer for a SnapManager license when a SnapManager operation is initiated. If the SnapManager license is not enabled on the filer either, the SnapManager operation fails and an error is written to the Windows event log.

License requirements

Use the following table to determine the licenses required to run SnapManager.

License requirements	
Filer	◆ SnapManager (for per-filer licensing) ◆ SnapRestore® feature ◆ SnapMirror (if in use) Note_____ If you use SnapMirror with per-filer SnapManager licensing, SnapManager must be licensed on both the source and target filers. _____
Host system	◆ SnapManager (for per-server licensing)

Service account requirements

The service account used by SnapManager must have proper Exchange permissions for SnapManager to function properly.

There are three predetermined permission levels for Exchange:

- ◆ Exchange View Only
- ◆ Exchange Administrator
- ◆ Exchange Full Administrator

The minimum level required for SnapManager is Exchange Administrator. This requirement can be satisfied using one of these methods:

- ◆ Assign Exchange Administrator permissions to the organization object.
- ◆ Create an Exchange administrative group and assign the correct permissions to that group.

Note

Right-clicking an object in the Exchange System Manager and selecting Delegate Control opens the Exchange Administration Delegation Wizard, which enables you to change that object's permissions.

If you require a greater granularity of control for the SnapManager service account, you can apply Exchange-specific permissions to the object. The minimum Exchange-specific permissions required for SnapManager are

- ◆ Read
- ◆ Execute
- ◆ Read Permissions
- ◆ List Contents
- ◆ Read Properties
- ◆ Administer Information Store
- ◆ View Information Store Status

Note

The user account or group you are configuring must also be a member of the Exchange server's local administrators group.

Backing up system resources and data

Backing up system resources Before you install SnapManager, NetApp strongly recommends that you back up your system resources and data using NTBackup or another industry standard backup utility.

To back up your system resources and data, complete the following steps.

Step	Action
1	Back up the operating system installation on the Exchange server, including the system state.
2	Back up the data on the local drives on the Exchange server.
3	Back up the boot and system drives, and the registry.
4	Use your backup utility to create and maintain a current emergency repair disk (ERD).

Planning your Exchange storage requirements

About the requirements

For SnapManager backup and restore to function, the Exchange data store must be located properly on one or more LUNs, and those LUNs need to be sized appropriately. The ability to restore individual databases, new in this version of SnapManager, requires additional data configuration restrictions.

Read this entire section, then plan your SnapManager Exchange data store LUN and filer volume requirements, based on your space and functionality requirements.

For some sample SnapManager configurations, see “[Sample SnapManager configurations](#)” on page 27. For more information about SnapManager for Exchange data store configuration, see the *SnapManager for Microsoft Exchange Best Practices Guide*.

Note

The version of Exchange that you are running does not affect your configuration requirements.

Data storage requirements for Exchange 2000 and 2003

Exchange 2000 and 2003 have the following data storage configuration requirements:

- ◆ There can be between one and four storage groups in an Exchange server.
- ◆ A storage group contains from one to five databases.
- ◆ For Exchange 2003 only, there can be a fifth storage group called the Recovery Storage Group. SnapManager does not support backing up or restoring to this special storage group.

Note

The presence of a Recovery Storage Group can interfere with SnapManager’s ability to perform a restore. For more information, see “[Exchange Recovery Storage Group incompatibility with SnapManager Restore](#)” on page 132.

- ◆ In a Windows cluster, there are one or more Exchange virtual servers. The totals for the entire clustered system cannot exceed the specified limits.
For example, there could be four Exchange virtual servers with one storage group each, or one Exchange virtual server with four storage groups, or any

combination in between, as long as the maximum number of storage groups is not exceeded.

Data storage requirements for Exchange 5.5

Microsoft Exchange 5.5 has the following data storage configuration requirements:

- ◆ Each Exchange server has one Information Store and one Directory Store.

Note

These stores correspond to storage groups for this document.

- ◆ The Information Store can have up to two databases, pub.edb and priv.edb.
- ◆ The Directory Store has only one database, dir.edb.

SnapManager rules for Exchange data store configuration

The following rules apply when you are configuring your Exchange data store for SnapManager 3.1 for Microsoft Exchange, for all supported versions of Exchange.

Note

These rules are enforced by the SnapManager Configuration Wizard.

- ◆ Exchange databases cannot share a LUN with databases from different storage groups.

Note

For Exchange 5.5, this means that the Information Store and the Directory Store must be on separate LUNs.

- ◆ Exchange databases cannot share a LUN with transaction logs, even if they are from the same storage group.
- ◆ Transaction logs from different storage groups can share a LUN with each other.
- ◆ The SnapInfo directory can have its own LUN, or can share a LUN with transaction logs. It cannot share a LUN with Exchange databases.
- ◆ All databases on a LUN are restored together. To be able to restore an individual database without restoring the rest of its storage group, that database must have its own LUN.
- ◆ Nothing can be stored on the Exchange LUNs except what SnapManager for Microsoft Exchange puts there.

Recommendations for Exchange data store configuration

For best results, consider the following Exchange data store recommendations:

- ◆ Do not place LUNs containing data from different Exchange servers in the same volume.

This recommendation helps you avoid several problems:

- ❖ SnapManager backups created for another Exchange server on the same volume use up snapshots for that volume but are only restorable for the Exchange server they were taken for.
 - ❖ Conflicting backup schedules between the two Exchange servers can lead to creating “busy snapshots”.
- ◆ Do not place LUNs in the filer’s root volume.
The root volume is reserved for use by Data ONTAP.
 - ◆ For faster restores, use the minimum number of LUNs required for your restore requirements.

Unless individual database restoration is a requirement in your environment, group your databases together.

Drive letter limitations and individual database restoration

Windows supports up to 26 drives. SnapManager needs one drive letter free to perform backups, verifications, or restores, so you can allocate up to 25 drives, but no more.

Databases that need to be restored individually each require their own LUN and drive letter. For Exchange 2000 or 2003, if you have a large number of databases to be individually restored, you might run out of drive letters. To avoid this, determine which databases must be restored individually, and which can be combined on a LUN with one or two other databases (all of which are restored together).

Caution

If you do not reserve at least one free drive letter for SnapManager, SnapManager cannot function properly. This requirement also applies to hosts running remote verification.

Considerations for converting to individual database restoration

If you are upgrading an existing SnapManager implementation and you are creating new LUNs to use individual database restore, your space requirements increase. This is because the database must be copied from its current location to the new location; in effect, it exists in both places until the move is complete. Depending on the size of the volume containing both LUNs, you might need to increase the volume size.

For more information about sizing your volumes, see [“Volume size calculation”](#) on page 38. Remember to include both the old and new LUNs when calculating the volume size.

Sample SnapManager configurations

About the sample configurations

The following sample configurations illustrate possible ways to satisfy the configuration rules. Your configuration will vary based on your sizing and capability requirements.

Your Exchange version determines which sample configurations apply:

- ◆ For sample configurations for Exchange 2000 or 2003, see “[Sample configurations for Exchange 2000 or 2003](#)” on page 28.
- ◆ For sample configurations for Exchange 5.5, see “[Sample configurations for Exchange 5.5](#)” on page 32.

Note

The LUN numbers are for illustration only; they do not correspond to any configuration setting on your host system.

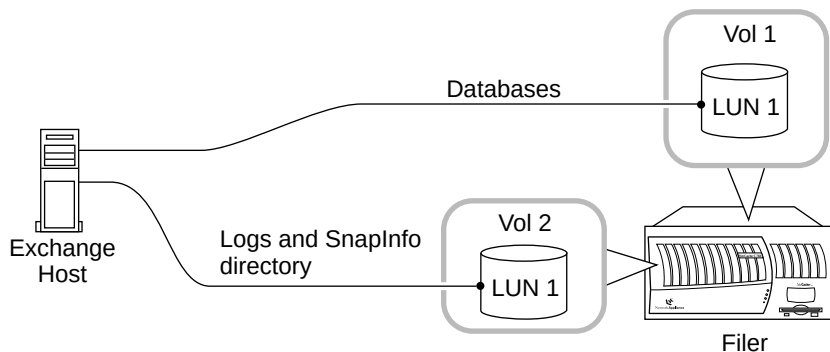
Sample configurations for Exchange 2000 or 2003

Sample Exchange 2000 or 2003 configuration 1

Sample configuration 1 for Exchange 2000 or 2003 has the following characteristics:

- ◆ One storage group with up to five databases
- ◆ Individual database restoration not required

Because this Exchange server has only one storage group, only one LUN is required for the databases. A total of two LUNs are required for this configuration, as shown in the following diagram.



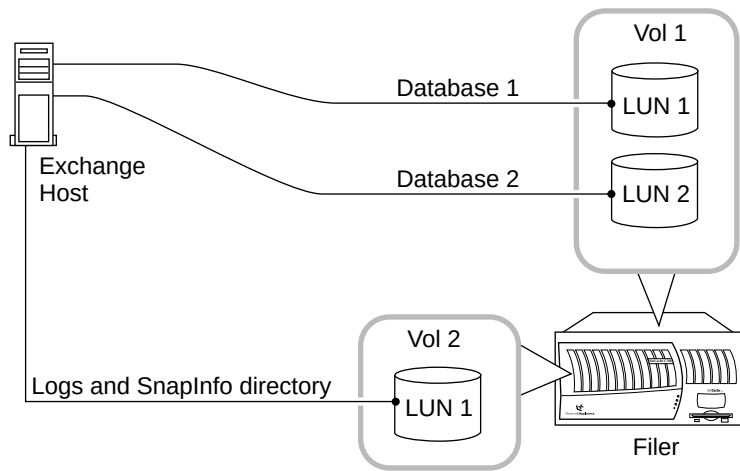
Sample configuration 1

Sample Exchange 2000 or 2003 configuration 2

Sample configuration 2 has the following characteristics:

- ◆ One storage group with two databases
- ◆ Individual database restoration required

Because the ability to restore either of the databases individually is required, each database must be placed on its own LUN. Therefore, three LUNs are required for this configuration, as shown in the following diagram.



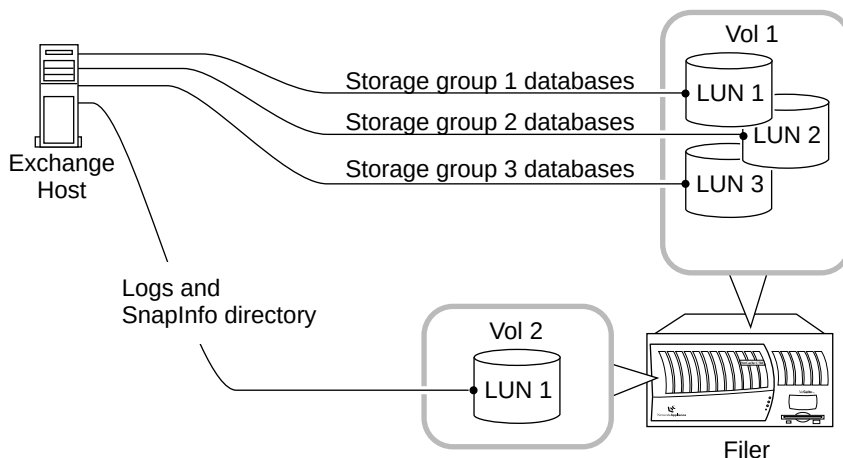
Sample configuration 2

Sample Exchange 2000 or 2003 configuration 3

Sample configuration 3 has the following characteristics:

- ◆ Three storage groups with up to five databases each
- ◆ Individual database restoration not required

Four LUNs are required for this configuration, as shown in the following diagram.



Sample configuration 3

Sample Exchange 2000 or 2003 configuration 4

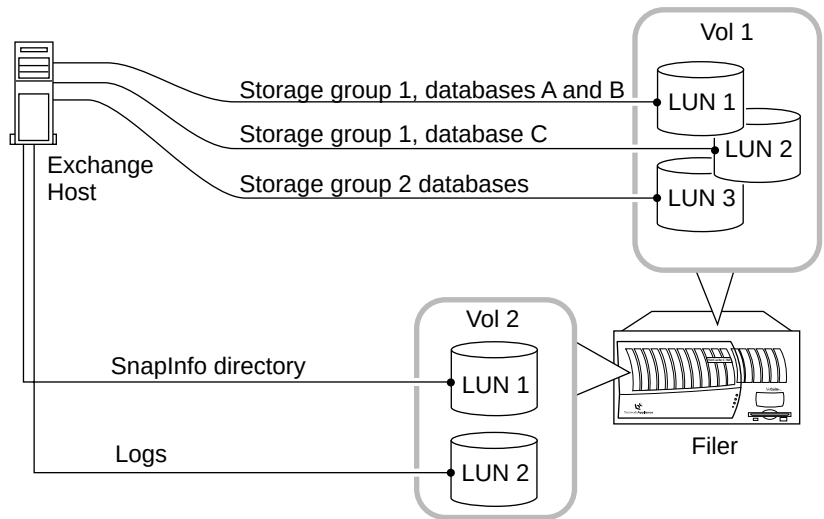
Sample configuration 4 has the following characteristics:

- ◆ Two storage groups with three databases each
- ◆ Individual database restoration required for database C in the first storage group

With this configuration, database C in storage group 1 can be restored without restoring any of the other databases in its storage group. However, databases A and B have to be restored at the same time. A total of five LUNs are used for this configuration, as shown in the following diagram.

Note

Configuring many databases on their own LUNs for individual restoration can cause you to run out of drive letters. For more information about drive letter limitations, see [“Drive letter limitations and individual database restoration”](#) on page 25.



Sample configuration 4

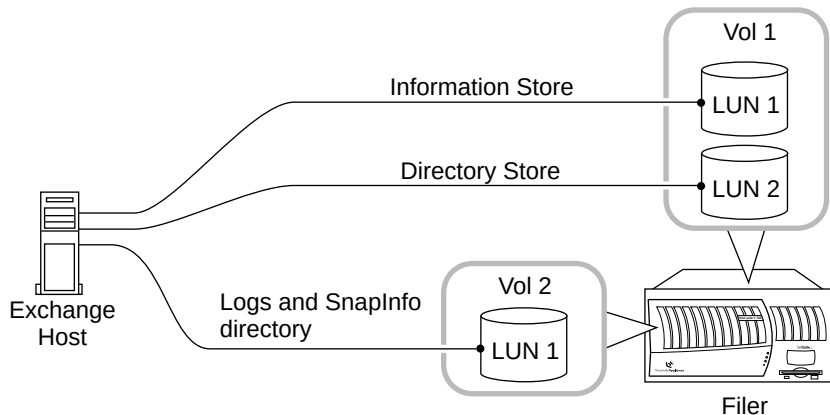
Sample configurations for Exchange 5.5

Sample Exchange 5.5 configuration 1

Sample configuration 1 for Exchange 5.5 has the following characteristics:

- ◆ Information Store with two databases, Directory Store with one database
- ◆ Individual database restoration not required

Two LUNs are required for the two stores, because the two stores cannot share a LUN. A total of three LUNs are required for this configuration, as shown in the following diagram.



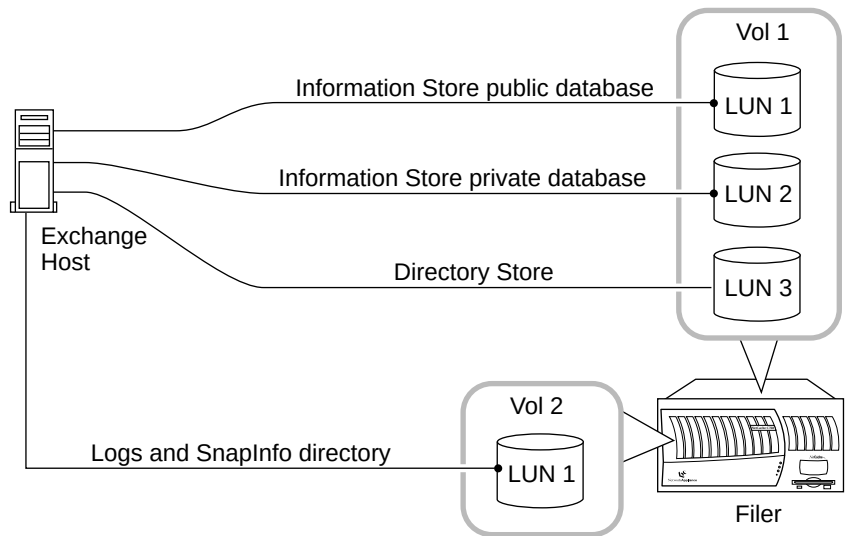
Sample configuration 1

Sample Exchange 5.5 configuration 2

Sample configuration 2 for Exchange 5.5 has the following characteristics:

- ◆ Information Store with two databases, Directory Store with one database
- ◆ Individual database restoration required for the private database in the Information Store

To support the individual restore requirement, the private database must have its own LUN. Because the public database and the Directory Store database cannot share a LUN, three LUNs are required just for the databases. A total of four LUNs are required for this configuration, as shown in the following diagram.



Sample configuration 2

Planning your data sizing requirements

Determining your data sizing requirements

After you determine how many LUNs you need for your SnapManager for Microsoft Exchange installation and what data those LUNs will hold, you must calculate their required size. This also determines the size of the volumes that contain the LUNs.

To determine the SnapManager data sizing requirements for the Exchange data and the SnapManager-specific data, complete the following steps.

Step	Action
1	Calculate the required size for the LUNs to hold your Exchange databases. For details, see “ Database LUN size calculation ” on page 35.
2	Calculate the required size for the LUN to hold your transaction logs. For details, see “ Transaction log and SnapInfo directory LUN size calculation ” on page 36.
3	If the SnapInfo directory is not on the same LUN as the transaction logs, calculate the required size for the LUN to hold the SnapInfo directory. For details, see “ SnapInfo directory LUN size calculation ” on page 36.
4	Calculate the required size of the volumes holding the LUNs. For details, see “ Volume size calculation ” on page 38.

LUN size calculation

Database LUN size calculation

The size of the LUN to hold Exchange databases must be at least as big as the sum of the expected maximum sizes of all databases on that LUN.

Estimated database values: To calculate the expected maximum size for an Exchange database LUN, you need the following values or estimates for each database on the LUN:

- ◆ Number of mailboxes in the database
- ◆ Mailbox quota
- ◆ Size of the deleted item cache (expressed as a percentage of the overall size of the data)
- ◆ Single instance sharing ratio

For more information about calculating the single instance sharing ratio, see [“Single instance sharing ratio calculation”](#) on page 41.

For more information about calculating the deleted item cache size, see [“Calculating the deleted item cache size”](#) on page 42.

Calculation formula: The following formula calculates the expected Exchange database size:

database size = ((number of mailboxes * mailbox quota) / single instance sharing ratio) + deleted item cache

The sum of the maximum expected database size for each database in your LUN provides the maximum expected database LUN size.

Example: The following facts and assumptions represent a sample Exchange installation:

- ◆ There is one storage group, with one database.
- ◆ There are 1,000 mailboxes with 100-MB quotas in the database.
- ◆ The single instance sharing ratio is equal to 1.5.
- ◆ The deleted item cache is 20% of the database.

In the following calculation, this is expressed by multiplying the estimated storage group size by 1.2 (or 120%).

For this example, the database size requirement calculation would be as follows:

database size = (((1,000 * 100 MB)/1.5) * 1.2) = 80,000 MB (~80 GB)

The maximum LUN size for this database would be approximately 80 GB. For this example, a LUN size of 90 GB is used to include 10 GB of free space.

Transaction log and SnapInfo directory LUN size calculation

The size of the LUN containing the transaction logs and SnapInfo directory depends on how much traffic your Exchange server gets, and your backup usage. The size calculation is performed per storage group.

Estimated transaction log values: The following values or estimates are required for each storage group whose transaction logs will be stored on this LUN:

- ◆ How many transaction log files are generated between backups
- ◆ How many backups will be retained online

Note

You can estimate how many transaction log files are generated by noting the maximum number of transaction logs that accumulate in the transaction log directory immediately before a backup over a period of several days.

Calculation formula: The following formula calculates the LUN size required for a LUN containing transaction logs and the SnapInfo directory:

transaction log & SnapInfo LUN size = ((number of transaction logs generated * 5 MB) * (number of backups to keep online + 1 for the active file system))

Example: Given the following parameters, at least 6 GB of LUN drive is required to accommodate the transaction logs and SnapInfo directory for the example Exchange databases. This is expressed by the formula following the parameters.

- ◆ The server generates, at most, 200 transaction logs between backups.
- ◆ Each transaction log is 5 MB.
- ◆ The plan is to keep five SnapManager backups online at the same time.

transaction log & SnapInfo LUN size = ((200 * 5 MB)*(5+1)) = 6,000 MB (~6 GB)

SnapInfo directory LUN size calculation

The SnapInfo directory contains the logs for all backups currently retained online. Therefore, if your SnapInfo directory is on a separate LUN from your transaction logs, the LUN size calculation is similar to the calculation for a combined transaction log and SnapInfo LUN, except that you do not have to include space for the current logs.

Calculation formula: The following formula calculates the LUN size required for a LUN containing only the SnapInfo directory:

$$\text{SnapInfo LUN size} = ((\text{number of transaction logs generated} * 5 \text{ MB}) * (\text{number of backups to keep online}))$$

Example: Given the following parameters, at least 5 GB of LUN drive is required to accommodate the SnapInfo directory for the example Exchange databases. This is expressed by the formula following the parameters.

- ◆ The server generates, at most, 200 transaction logs between backups.
- ◆ Each transaction log is 5 MB.
- ◆ The plan is to keep five SnapManager backups online at the same time.

$$\text{transaction log \& SnapInfo LUN size} = ((200 * 5 \text{ MB}) * 5) = 5,000 \text{ MB} (\sim 5 \text{ GB})$$

Transaction logs LUN size calculation

If your SnapInfo directory is on a separate LUN from your transaction logs, the LUN size calculation for the transaction log LUN only has to take into account how many logs accumulate between backups.

Calculation formula: The following formula calculates the LUN size required for a LUN containing only the transaction logs:

$$\text{transaction log LUN size} = \text{number of transaction logs generated} * 5 \text{ MB}$$

Example: Given the following parameters, at least 1 GB of LUN drive is required to accommodate the transaction logs for the example Exchange databases. This is expressed by the formula following the parameters.

- ◆ The server generates, at most, 200 transaction logs between backups.
- ◆ Each transaction log is 5 MB.

$$\text{transaction log LUN size} = 200 * 5 \text{ MB} = 1,000 \text{ MB} (\sim 1 \text{ GB})$$

Volume size calculation

Database volume size calculation

The calculation for the Exchange database volume size depends on the size of the databases in the volume, the rate of change of your data, and your backup usage.

Estimated database volume values: To calculate the volume size requirement for a LUN holding Exchange databases, you need the following values or estimates for your installation:

- ◆ The size of the LUNs (as calculated using the database LUN formula)
- ◆ The approximate percentage of the databases that you expect to change between backups
- ◆ How many backups you plan to retain online

Calculation formula: The following formula calculates the minimum volume size requirement for the Exchange database LUNs:

$\text{minDatabaseVolumeSize} = (2 * \text{LUN size}) + (\text{number of online backups} * \text{percentage data change} * \text{max database size})$

Example: For the example, assume the following facts:

- ◆ Approximately 10% of the database changes between backups.
- ◆ Five backups will be retained online.

The minimum volume size for the database LUN is calculated as follows:

$$(2 * 90 \text{ GB}) + (5 * 10\% * 80 \text{ GB}) = 220 \text{ GB}$$

Transaction log volume size calculation

The size of the transaction log volume depends on how much traffic your Exchange server gets, and your backup usage.

Estimated transaction log values: The following values or estimates are required for the entire volume where the transaction logs are stored:

- ◆ How many transaction log files are generated between backups
- ◆ How many backups will be retained online

Calculation formula: The following formula calculates the transaction log volume size:

$$\text{transaction log volume size} = (\text{transaction log LUN size in MB} * 2) + (2 * \text{number of transaction logs generated} * 5 \text{ MB} * \text{number of backups to keep online})$$

This is always less than four times the size of the transaction log LUN. Therefore, if disk capacity is not constrained, you can use this simplified formula:

$$\text{transaction log volume size} = 4 * \text{transaction log LUN size}$$

Example: For the example, the transaction log volume size could be calculated using the full formula, as follows:

$$\begin{aligned} \text{transaction log volume size} &= (6,000 \text{ MB} * 2) + (2 * 200 * 5 \text{ MB} * 5) \\ &= 12,000 + 10,000 \text{ MB} = 22,000 \text{ MB} \text{ (~22 GB)} \end{aligned}$$

Alternatively, you could calculate the volume using the simplified formula, as follows:

$$\text{transaction log volume size} = (6,000 \text{ MB} * 4) = 24,000 \text{ MB} \text{ (~24 GB)}$$

Volume size calculation for multiple Exchange LUNs

If you plan to use a single filer volume for storing multiple LUNs to hold Exchange or SnapManager data, the volume sizing requirements of all the components must be summed to calculate the size requirement for the volume.

Note

NetApp and Microsoft recommend that Exchange databases and transaction logs be kept on separate volumes. This example is for illustration only.

Example: Assume now that you want to create one volume for an Exchange installation with the following characteristics:

- ◆ Four storage groups, each with 1,000 mailboxes and 100-MB quotas
- ◆ Single instance sharing ratio of 1.5
- ◆ Deleted item cache is 20% of the data
- ◆ A combined maximum of 800 transaction logs generated between backups
- ◆ 10% database change between backups
- ◆ Five online backups retained

LUN size requirements	Resulting volume size requirement
Each storage group requires a 90-GB LUN, as calculated previously.	4 LUNs * 220 GB = 880 GB
The transaction log and SnapInfo LUN requires the following LUN size: $(800 * 5 \text{ MB}) * (5+1) = 24,000 \text{ MB}$ or about 24 GB.	$(2 * 24,000 \text{ MB}) + (2 * 800 * 5 \text{ MB} * 5) = 88,000 \text{ MB}$ or approximately 88 GB
Result: The five LUNs must reside in a volume whose size is approximately $880 + 88 = 968 \text{ GB}$.	

Single instance sharing ratio calculation

Calculation methods

The following table describes the correct method for calculating the single instance sharing ratio for your installation.

If you have...	Use...
A new Exchange installation	1.5 for your single instance sharing ratio. After you have a more mature installation, recalculate the ratio using the procedure below.
An existing Exchange installation	The following procedure to calculate the single instance sharing ratio for your installation.

Calculation guidelines

Use these guidelines when calculating the single instance ratio:

- ◆ Track the ratio over time during peak production times, and use the lowest ratio value recorded.
- ◆ If you get different ratio values for different databases within a storage group, use the lowest value for that storage group in your calculation.

Calculating the single instance ratio

To calculate the single instance sharing ratio for your installation, complete the following steps.

Step	Action
1	Run the Windows Performance Monitor (perfmon).
2	Right-click the graph and select Add Counters. Result: The Add Counters dialog box is displayed.

Step	Action
3	In the Performance Object drop-down list, select the appropriate performance object for your version of Exchange: ◆ For Exchange 2000 or 2003, select MSExchangeIS Mailbox. ◆ For Exchange 5.5, select MSExchangeIS Private.
4	In the Select Counter From List option, select Single Instance Ratio.
5	Select all databases in the instances list for the storage group you are measuring.
6	Click Add.

Calculating the deleted item cache size

To calculate the deleted item cache size for your installation, complete the following steps.

Step	Action
1	Run the Windows Performance Monitor (perfmon).
2	Right-click the graph and select Add Counters. Result: The Add Counters dialog box is displayed.
3	In the Performance Object drop-down list, select the appropriate performance object for your version of Exchange: ◆ For Exchange 2000 or 2003, select MSExchangeIS Mailbox. ◆ For Exchange 5.5, select MSExchangeIS Private.
4	In the Select Counter From List option, select Total Size of Recoverable Items.
5	Select all databases in the instances list for the storage group you are measuring.
6	Click Add.

Creating the SnapManager data configuration plan

Importance of the plan

After you determine the filer volumes and LUNs required for your Exchange configuration, and the size of those volumes and LUNs, you need to record this information in one place; this comprises your SnapManager data configuration plan.

This information is used during the rest of the installation process. It could also be invaluable if problems arise later with your Exchange system. Knowing the volume and drive for all your LUNs can aid the diagnosis and resolution of many potential issues.

Creating the plan

To create your SnapManager data configuration plan, complete the following step.

Step	Action
1	For each LUN you need, record the following information: ◆ Purpose ◆ Size ◆ Volume and qtree ◆ Assigned drive letter You refer to this information throughout the installation and configuration process.

About this chapter This chapter provides the information you need to install SnapManager 3.1 for Microsoft Exchange or upgrade to it from a previous version.

Topics in this chapter This chapter discusses the following topics:

- ◆ “[Installing SnapManager](#)” on page 46
- ◆ “[Upgrading to SnapManager 3.1 for Microsoft Exchange](#)” on page 56
- ◆ “[Uninstalling SnapManager](#)” on page 65

Installing SnapManager

Types of installations

You can install SnapManager 3.1 for Microsoft Exchange in the following configurations:

- ◆ On a stand-alone system
For details, see “[Installing SnapManager on a stand-alone system](#)” on page 47.
- ◆ In a new Windows cluster
For details, see “[Installing SnapManager and creating a new Windows cluster](#)” on page 48.
- ◆ In an existing Windows cluster
For details, see “[Installing SnapManager in an existing Windows cluster](#)” on page 52.

Installing SnapManager on a stand-alone system

When to use this procedure

This procedure is for installing and configuring SnapManager 3.1 for Microsoft Exchange on a stand-alone (not clustered) system. Follow the instructions in this section if both of the following statements are true for your environment:

- ◆ Your Exchange server is *not* clustered.
- ◆ You are *not* in the process of creating a cluster to run Exchange and SnapManager.

Otherwise, use one of the following sections:

- ◆ [“Installing SnapManager and creating a new Windows cluster”](#) on page 48
- ◆ [“Installing SnapManager in an existing Windows cluster”](#) on page 52

Installing SnapManager on a stand-alone system

To install and configure SnapManager 3.1 for Microsoft Exchange on a stand-alone system, complete the following steps.

Step	Action
1	Install SnapManager. For details, see “Installing the SnapManager software” on page 54.
2	Migrate the Exchange data store to the LUNs. For details, see “Using the Configuration Wizard to configure your data store” on page 71.
3	Create a SnapManager backup. For details, see “Backing Up with SnapManager Backup” on page 83.

Installing SnapManager and creating a new Windows cluster

When to use this procedure

This procedure is for installing and configuring SnapManager 3.1 for Microsoft Exchange during the process of creating a new Windows cluster. Follow the instructions in this section if you have two to four systems that you are ready to configure as a Windows cluster.

If you do not intend to configure a Windows cluster, use one of the following procedures:

- ◆ [“Installing SnapManager on a stand-alone system”](#) on page 47
- ◆ [“Installing SnapManager in an existing Windows cluster”](#) on page 52

Disk requirements for configuration options

You can configure your Windows cluster in either Active/Passive or Active/Active mode. However, Microsoft Exchange 5.5 supports only the Active/Passive mode.

Active/Passive configurations: In an Active/Passive Exchange cluster, there are two to four clustered nodes and one virtual Exchange server. If the node running Exchange fails, the cluster transfers the virtual Exchange server to the other node, which takes over the disks previously used by the partner node.

For an Active/Passive Exchange cluster, assuming that your Exchange data is on a shared resource, your disk requirements are the same as for a stand-alone Exchange system, with the addition of one LUN for the quorum disk.

Note

The Active/Passive configuration is recommended by Microsoft to avoid performance degradation if a node fails.

Active/Active configurations: In an Active/Active two-node configuration, there are two clustered nodes and an Exchange virtual server running on each node. If one node fails, the other node takes over the virtual server running on the failed node.

Because both nodes need to be able to run an active Exchange instance, each node requires its own disks, as if it were a self-contained stand-alone system. In addition, one extra LUN is needed for the quorum disk.

Note

Exchange 2000 does not support more than two active nodes in the same cluster. Exchange 5.5 does not support more than one active node in a cluster, so you cannot configure an Active/Active mode cluster if you are using Exchange 5.5.

Installing in a new Windows cluster

The procedure for installing SnapManager 3.1 for Microsoft Exchange in a new Windows cluster assumes the following facts:

- ◆ You have two to four systems that you are ready to configure into a Windows cluster.
- ◆ Microsoft Exchange is not installed on either system.
- ◆ You will use a LUN as the quorum disk.

To create the cluster and install and configure SnapManager 3.1 for Microsoft Exchange as part of the cluster, complete the following steps.

Step	Action
Create cluster	
1	Follow the procedure in your SnapDrive documentation for creating a Windows cluster with a virtual quorum disk.
Install and verify Exchange	
2	Create all required LUNs according to your data configuration plan. For information about creating LUNs, see your SnapDrive documentation.
3	Install and configure Exchange on one node, then install Exchange on the remaining nodes. Note Exchange virtual servers are not created during this step. See the Microsoft documentation for information about installing Exchange in a cluster. You do not have to use the default cluster group, but whatever group you use must contain an IP address resource, a network name resource, and at least one physical disk cluster resource (LUN).

Step	Action
4	Using Cluster Administrator, create an Exchange System Attendant Resource in the cluster group where the LUN physical disk resources that store the Exchange databases and transaction logs will reside. Note Do this from the node that owns the cluster group containing the LUN physical disk resources. During this step you are prompted for an Exchange data directory. This directory is also where the Exchange system files are placed. You can accept the default location now; these system files can be moved in a later step, if necessary, using the Configuration Wizard. Specify the LUN physical disk resources and the Network Name resource as dependencies for the Exchange System Attendant Resource. Result: The required Exchange cluster resources are created.
5	Bring the cluster group online if it is not already, and verify that the Exchange cluster is functioning correctly by moving the cluster group containing the newly created Exchange virtual server to the other node and back.
Install and verify SnapManager	
6	Install SnapManager on all nodes, starting with the node that currently owns the cluster resources. See “Installing the SnapManager software” on page 54.
7	Launch SnapManager, and run the SnapManager Configuration Wizard to ensure the correct disposition of the Exchange databases and transaction log files according to the SnapManager data configuration plan you created in the install preparation. See “Using the Configuration Wizard to configure your data store” on page 71.

Step	Action
8	If you want to have one set of report directories no matter what node you are running SnapManager from, move your report directory to a shared disk resource that does not contain Exchange or SnapManager data. See “About locating the report directory in a Windows cluster” on page 215.
9	Run a SnapManager Backup. See “Backing Up with SnapManager Backup” on page 83.

Installing SnapManager in an existing Windows cluster

When to use this procedure

This procedure is for installing and configuring SnapManager 3.1 for Microsoft Exchange in an existing Windows cluster. Follow the instructions in this section if your Exchange server is already running in a Windows cluster.

Otherwise, use one of the following sections:

- ◆ “[Installing SnapManager on a stand-alone system](#)” on page 47
- ◆ “[Installing SnapManager and creating a new Windows cluster](#)” on page 48

Installing and configuring SnapManager in an existing cluster

To install and configure SnapManager 3.1 for Microsoft Exchange in an existing Windows cluster, complete the following steps.

Note

Before you complete these steps, make sure that you have prepared your system and environment as described in “[Preinstall or preupgrade process](#)” on page 15.

Step	Action
1	Verify that the Exchange virtual servers and the cluster services are functioning properly by moving the Exchange virtual server from one cluster node to the other and back. If any errors occur, or if any of the cluster resources do not start properly, resolve the issue before continuing.
2	Install or upgrade SnapDrive as required. For details, see your SnapDrive documentation.

Step	Action
3	<i>From the node that owns the cluster group that contains the Exchange virtual server, create the shared LUNs to hold the Exchange databases and transaction log files, according to your SnapManager data configuration plan.</i> For details, see your SnapDrive documentation. Note These shared LUNs must be physical disk resources in the cluster group that contains the Exchange virtual server that uses them.
4	Verify that the System Attendant Resource dependencies are set correctly. The System Attendant Resource must depend on all the LUN physical disk resources and the Network Name resource in this cluster group.
5	Verify that the Exchange virtual servers and the cluster services are functioning correctly by moving the cluster group containing the newly created Exchange virtual server to the other node and back.
6	Install SnapManager on all nodes. See “Installing the SnapManager software” on page 54.
7	Run the SnapManager Configuration Wizard to ensure the correct disposition of the Exchange databases and transaction log files according to the SnapManager data configuration plan you created in the install preparation. See “Using the Configuration Wizard to configure your data store” on page 71.
8	If you want to have one set of report directories no matter what node you are running SnapManager from, move your report directory to a shared disk resource. For information, see “About locating the report directory in a Windows cluster” on page 215.
9	Run a SnapManager Backup. See “Backing Up with SnapManager Backup” on page 83.

Performing the basic installation process

About this section

This section provides the basic steps you follow to install SnapManager 3.1 for Microsoft Exchange. Other sections in this chapter that describe how to install SnapManager for various configurations refer to this section for the installation steps.

Caution

Do not perform these steps until instructed to do so in one of the previous installation procedures.

Installing the SnapManager software

To install SnapManager 3.1 for Microsoft Exchange, complete the following steps.

Caution

Do this from the system console, not from a Terminal Services client.

Step	Action
1	Insert the SnapManager CD-ROM or download the install package.
2	Browse to the SnapManager install package and double-click the installation executable (SME3.1.exe or setup.exe) to launch the installer.

Step	Action
3	Follow the instructions in the install wizard. You need the following information: ◆ Customer name and organization ◆ Destination folder for install ◆ Server license key (for per-server licensing only) ◆ Account name and password for the service account for SnapManager. Note _____ This account must have the required permissions. For details, see “Service account requirements” on page 21.

Upgrading to SnapManager 3.1 for Microsoft Exchange

Types of upgrades

You can upgrade to SnapManager 3.1 for Microsoft Exchange from the following older versions of SnapManager:

- ◆ SnapManager 3.0 for Microsoft Exchange
For details, see “[Upgrading from SnapManager for Exchange 2000 v1.1 or later](#)” on page 57.
- ◆ SnapManager for Microsoft Exchange 2000 v1.1.x
For details, see “[Upgrading from SnapManager for Exchange 2000 v1.1 or later](#)” on page 57.
- ◆ SnapManager for Microsoft Exchange 2000 v1.0
For details, see “[Upgrading from SnapManager for Exchange 2000 v1.0](#)” on page 59.
- ◆ SnapManager for Microsoft Exchange 5.5 v1.1
For details, see “[Upgrading from SnapManager for Microsoft Exchange 5.5](#)” on page 60.

Upgrading from SnapManager for Exchange 2000 v1.1 or later

Upgrading from v1.1 or later

To upgrade to SnapManager 3.1 for Microsoft Exchange from SnapManager for Microsoft Exchange 2000 v1.1 or later, including removing the existing version of SnapManager from your system, complete the following steps.

Note

Before you complete these steps, make sure that you have prepared your system and environment as described in [“Preinstall or preupgrade process”](#) on page 15.

You do not need to stop Exchange services when you upgrade SnapManager. Exchange can continue to run while you upgrade SnapManager. However, if you need to interrupt connectivity to the Exchange data when upgrading other components, such as filers or connection protocols, you need to take Exchange offline.

Step	Action
1	If you have not already done so, back up system resources and databases. For details, see “Backing up system resources and data” on page 22.
2	If you have not already done so, verify that your host system meets the minimum requirements. For details, see “Verifying system requirements” on page 18.
3	Ensure that the version of Data ONTAP running on your filers complies with the system requirements for your target version of SnapDrive. For information about upgrading Data ONTAP, see the <i>System Administration Storage Management Guide</i> for your version of Data ONTAP.
4	Upgrade to the required version of SnapDrive if necessary. For information about upgrading SnapDrive, see your SnapDrive documentation.

Step	Action
5	Make any changes to your storage configuration (LUNs, volumes, etc.) that you identified in the preupgrade process.
6	Exit SnapManager, if you have not already done so.
7	Upgrade to SnapManager 3.1 for Microsoft Exchange by installing the new product. See “Installing SnapManager” on page 46. Note— As part of the upgrade, you are asked whether you want to retain your current installation directory. If you change your installation directory, it could cause existing scripts that rely on the SnapManager installation directory path to fail.
8	Run the SnapManager Configuration Wizard. If you identified required changes to the configuration of your Exchange data store, make those changes now. Otherwise, just run through the wizard without making changes to the configuration. See “Using the Configuration Wizard to configure your data store” on page 71.
9	Run a SnapManager Backup. See “Backing Up with SnapManager Backup” on page 83.

Upgrading to SnapManager 3.1 for Microsoft Exchange

Upgrading from SnapManager for Exchange 2000 v1.0

Upgrading from
v1.0

To upgrade from SnapManager for Exchange 2000 v1.0.x, complete the following steps.

Step	Action
1	Uninstall SnapManager for Exchange 1.0. For details, see “ Uninstalling SnapManager ” on page 65.
2	Perform a new installation of SnapManager 3.1 for Microsoft Exchange. For details, see “ Installing SnapManager ” on page 46. Note _____ When you launch SnapManager 3.1 for Microsoft Exchange for the first time after upgrading from SnapManager 1.0, a window appears prompting you to upgrade the backup name from the old version to the new version. (The backup name now includes the Exchange Server name.) _____

Upgrading from SnapManager for Microsoft Exchange 5.5

Upgrading from SnapManager for Exchange 5.5

To upgrade from SnapManager for Microsoft Exchange 5.5 v1.1.x, complete the following steps.

Note

Before you complete these steps, make sure that you have prepared your system and environment as described in “[Preinstall or preupgrade process](#)” on page 15.

Step	Action
Prepare your host system for the upgrade	
1	If you are running a version of SnapManager for Microsoft Exchange earlier than 1.1.1R2, upgrade to 1.1.1R2. Note_____ This is necessary to support a version of Data ONTAP that is also supported by SnapManager 3.1 for Microsoft Exchange.
2	Create a backup using SnapManager for Microsoft Exchange 5.5. Note_____ After the upgrade is complete, you will delete all backups created using SnapManager for Microsoft Exchange 5.5. To make that process easier, you can optionally delete all but the most current backup now. To delete all your old backups when you create the new backup, use the following command: snappbexc -d 1 Note the name of the backup so you can easily remove it after the upgrade is complete.
Prepare your environment for the upgrade	

Step	Action
3	Determine your target version for SnapDrive and Data ONTAP. Do not install SnapDrive or Data ONTAP yet; they are installed in later steps. Note You must select a version of Data ONTAP that is supported both by SnapDrive and by SnapManager for Microsoft Exchange 5.5 v1.1.1R2. You must select a version of SnapDrive that is supported by SnapManager 3.1 for Microsoft Exchange. For more information about compatibility between SnapDrive, SnapManager, and Data ONTAP, see the SnapManager and SnapDrive Qualification Matrix on the NOW site at http://now.netapp.com/NOW/knowledge/docs/olio/guides/snapmanager_snapdrive_compatibility.
4	If you have not already done so, ensure that the version of Windows running on the host system complies with the system requirements for SnapManager 3.1 for Microsoft Exchange and the target SnapDrive version, including all required service packs and hotfixes. For current system requirements, see the SnapManager 3.1 for Microsoft Exchange and SnapDrive Product Description Pages on the NOW site at http://now.netapp.com/NOW/cgi-bin/software.

Step	Action
5	Ensure that the version of Data ONTAP running on your filers complies with the system requirements for the target SnapDrive version, upgrading Data ONTAP if necessary. For current system requirements, see the SnapDrive Description Page on the NOW site at http://now.netapp.com/NOW/cgi-bin/software. Note_____ If you upgrade to Data ONTAP 6.5 or later, you can no longer perform a restore using SnapManager for Microsoft Exchange 5.5 with the Use SnapRestore option enabled. At this point, you can still perform a copy-based restore.
6	Ensure that your filer has enough free space to accommodate the creation of all the new LUNs that you identified in your SnapManager data configuration plan. Note_____ Remember that if you are moving data to a new location, that data will temporarily exist in both places, requiring twice the space on the volume that you will need after the move is complete. _____ For more information about sizing your LUNs and volumes correctly, and preparing a data configuration plan, see “Preparing to Install or Upgrade SnapManager” on page 15.
7	Disable or cancel all scheduled SnapManager backup and verification jobs. Make sure that you identify all jobs. Check the following tools for scheduled SnapManager jobs: ◆ AT service ◆ Scheduled tasks (Windows 2000 only) ◆ All third-party schedulers in use
8	Install SnapDrive. For more information about installing SnapDrive, see your SnapDrive documentation.

Step	Action
9	Using the filer administration tools, create the volumes outlined in your data configuration plan. For information about creating volumes for use with SnapDrive, see your SnapDrive documentation.
10	Using SnapDrive, create the LUNs outlined in your data configuration plan. For more information about creating LUNs, see your SnapDrive documentation.
11	Make sure that there is a copy of <code>esefile.exe</code> in <code>\Exchsrvr\bin</code> .
Install and configure the new SnapManager	
12	Install SnapManager 3.1 for Microsoft Exchange. Note_____ After you run the SnapManager Configuration Wizard in the next step, you can no longer perform any restore using SnapManager for Exchange 5.5. _____
13	Start SnapManager 3.1 for Microsoft Exchange and run the SnapManager Configuration Wizard to migrate your data to your newly created LUNs. See “Using the Configuration Wizard to configure your data store” on page 71.
14	Run a SnapManager Backup. See Chapter 5, “Backing Up with SnapManager Backup,” on page 83.
Perform post-upgrade cleanup	

Step	Action
15	Using Add or Remove Programs in the Control Panel, uninstall SnapManager for Microsoft Exchange 5.5. Note_____ When SnapManager for Microsoft Exchange 5.5 is uninstalled, NetAppDrive is uninstalled as well. If you are using NetAppDrive outside of Exchange, any drive mappings and dependencies you created using NetAppDrive will be lost. _____
16	Using FilerView, delete all remaining backups that were created by SnapManager for Microsoft Exchange 5.5. Snapshots with the month name spelled out, rather than in numerical format, are from the old version of SnapManager. In addition, the newer snapshots have two underscores between the snapshot type and the timestamp. For example, the following snapshot names are from SnapManager for Microsoft Exchange 5.5: ◆ exchsnap_CLABSRVR_04Mar19_1439 ◆ exchsnap_CLABSRVR_Recent The following snapshot names are from the new version, SnapManager 3.1 for Microsoft Exchange: ◆ exchsnap__clabserver_03-22-2004_17.25.30 ◆ exchsnap__clabserver__recent
17	If you did not delete your old scheduled jobs in Step 7, delete them now.

Uninstalling SnapManager

Uninstalling SnapManager

You do not need to stop the Exchange service when you uninstall SnapManager 3.1 for Microsoft Exchange. Exchange can continue to run while you uninstall SnapManager and afterward.

Caution—Do not attempt to remove a currently installed version of SnapManager using a method other than the approach described here. To do so could cause system problems resulting from unknown remaining files.

To uninstall a previous version of SnapManager 3.1 for Microsoft Exchange and all its components, complete the following steps.

Step	Action
1	If you want to continue to store your Exchange data store on the filer, skip to Step 5 .
2	Use Exchange System Manager to move your databases, transaction logs, and system files from the LUNs onto a local disk with enough space to hold them.
3	Confirm that the data was moved correctly and that your Exchange server is functioning normally.
4	Disconnect or delete your LUNs from your SnapManager host. For information about disconnecting or deleting LUNs, see your SnapDrive documentation.
5	In the Windows Control Panel, click Add/Remove Programs, and choose the version of SnapManager you are uninstalling.
6	Click Remove.

About this chapter This chapter provides the information you need to configure your Microsoft Exchange data using SnapManager 3.1 for Microsoft Exchange.

Topics in this chapter This chapter discusses the following topics:

- ◆ [“Understanding the SnapManager Configuration Wizard”](#) on page 68
- ◆ [“Using the Configuration Wizard to configure your data store”](#) on page 71

Understanding the SnapManager Configuration Wizard

Functions the Configuration Wizard performs

The SnapManager Configuration Wizard provides the following capabilities:

- ◆ If Exchange databases need to be moved, the wizard dismounts the databases in a storage group, moves the Exchange database and transaction log files to the selected LUN, and remounts the databases.
- ◆ The wizard creates a SnapInfo directory that stores information about the backup sets and the backed-up transaction logs.
- ◆ The wizard disables circular logging for all storage groups that are moved to a LUN, to enable up-to-the-minute recovery of those storage groups.

When to use the Configuration Wizard

You must use the SnapManager Configuration Wizard to move the Exchange databases and transaction logs so that they are placed in the correct location for proper functionality of the SnapManager Backup and Restore processes.

After the initial configuration, you can return to the Configuration Wizard at any time to review or make changes to your Exchange data store configuration.

Caution

Do not use the Exchange System Manager to move Exchange databases or transaction logs for any Exchange system that has been configured using SnapManager. Doing so prevents SnapManager from functioning correctly.

Note

Remember that moving Exchange databases causes them to be taken offline during the move operation.

Understanding the Exchange and SnapManager component properties

When you use the Configuration Wizard, you are determining the placement of several components of Exchange and SnapManager. You can see the current placement of these components by selecting them in the Backup tab window and selecting View > Properties, or by using the Details buttons in the Configuration Wizard.

The following table describes these components and how they are used in your SnapManager environment.

Component	Description
SnapInfo Directory	Contains SnapManager backup information, copies of transaction log files, and other data critical to the backup set. For more information about the SnapInfo directory, see “SnapManager Backup and the SnapInfo directory” on page 87.
SMTP System Path	The directories used by the SMTP queue.
MTA System Path	The directories used by the MTA queue.
Transaction Log Files	The location of the Exchange transaction logs. The SnapManager Configuration Wizard places the transaction log files in this location. The transaction logs contain changes made to the Exchange databases since the last backup, enabling an up-to-the-minute restore.
System Path	Path to the directory that contains the Exchange storage group system files. They are moved to this location by the SnapManager Configuration Wizard. Note _____ For host systems running Windows 2000 Server, the system files must be on a LUN containing that storage group’s transaction logs. For host systems running Windows Server 2003, the system files must be on a LUN containing Exchange databases.

Component	Description
Storage Group Database Settings (Database Settings for Exchange 5.5)	Lists the databases for this storage group or Store. To see more information about any of the databases listed, you can highlight the database name and click Details.
Database	Displays the paths for the .edb and .stm files for the selected Exchange database. The .edb file stores message and attachment content generated by MAPI clients, and message properties such as author, recipients, subject, and priority. The .stm file holds native Internet content (for example, MIME).

Using the Configuration Wizard to configure your data store

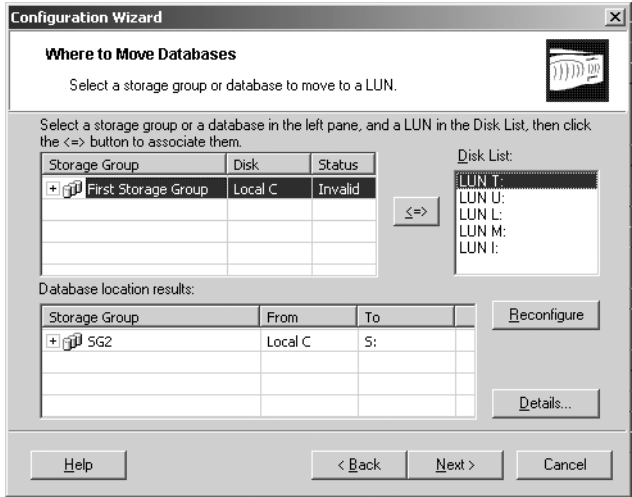
Configuring the Exchange data store

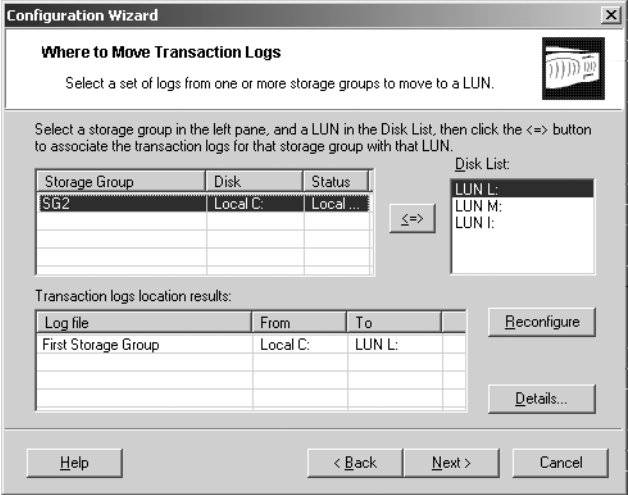
To configure your Exchange data store for SnapManager 3.1 for Microsoft Exchange, complete the following steps.

Note—
The windows shown in this procedure are for the Exchange 2000 or 2003 version of SnapManager. If you are using Exchange 5.5, some of the text you see is slightly different. However, the actions you take to perform these steps are the same.

Step	Action
1	In the Windows user interface, click Start > Programs > SnapManager for Microsoft Exchange. Caution— Run SnapManager from the system console, not from a Terminal Services client. Note— If this is not the first time you have started SnapManager for Microsoft Exchange, skip to Step 3. Result: SnapManager is launched, and the Connect to Exchange Server window is displayed.
2	In the Connect to Exchange Server window, select the Exchange server you want this instance of SnapManager to manage and click OK.
3	If the Configuration Wizard is not already started, click the Configuration Wizard button to start it now.
4	Click Next on the Welcome window to begin the configuration. Result: The Database Verification Server window appears.

Step	Action
5	In the Database Verification Server window, enter or browse to the computer to be used for database verification, then click Next. If the computer used for database verification does not have Exchange installed, you must put the necessary files on it. For details, see “Remote verification” on page 110. Note _____ You do not need to specify a verification server now. For details, see “Designating a remote verification server” on page 112.
6	On the Exchange Server to Configure window, click Next to confirm the server to be configured. Result: The Where to Move Databases window is displayed.

Step	Action
7	In the Where to Move Databases window, associate your Exchange storage groups (Stores) or databases with the correct LUNs according to your SnapManager data configuration plan. For more information about using this window, see “Moving databases using the Configuration Wizard” on page 77. After you associate all databases with a LUN, click Next. Example: In the following example, the SG2 storage group has already been associated with LUN S. When you click the move (<=>) button, the First Storage Group is associated with LUN T, and you can proceed to the next window. 

Step	Action
8	In the Where to Move Transaction Logs window, associate your transaction logs with the correct LUNs according to your SnapManager data configuration plan. For more information about using this window, see “Moving transaction logs using the Configuration Wizard” on page 79. After you associate all transaction logs with a LUN, click Next. Example: In the following example, the transaction logs for the First Storage Group have been associated with LUN L. When you click the move (<=>) button, the transaction logs for SG2 will be associated with LUN L also, and you can proceed to the next window. 

Step	Action
9	In the Where to Move SMTP and MTA System Files window, determine the location of your SMTP and MTA system files. Note_____ The SMTP and MTA system files cannot reside on a LUN that also contains Exchange databases. _____ For more information about using this window, see “About the SMTP and MTA queue location” on page 80. After you determine the location of all listed system files, click Next.
10	In the Where to Put the SnapInfo Directory window, select the SnapInfo files and the LUN to move them to, then click the move (<=>) button and click Next.
11	If you are installing SnapManager on a stand-alone system that has the Microsoft iSCSI initiator installed, select whether you want to configure your Microsoft iSCSI service as a dependency for the Microsoft Exchange System Attendant, and click Next. Note_____ NetApp recommends that you select Yes so that Microsoft Exchange cannot start before the Microsoft iSCSI service is ready to accept connections. _____

Step	Action
12	In the Configure Automatic Event Notification window, you can configure SnapManager to notify a designated recipient, or NetApp, when problems occur. After you configure your event notification, click Next. Note NetApp recommends that you use e-mail notification and Autosupport to ensure that if any problems with your SnapManager backups occur, you are alerted and can take corrective action in a timely manner. For information about configuring e-mail notification, see “Configuring e-mail notification” on page 220. For information about configuring Autosupport, see “Configuring filer SysLog and Autosupport” on page 224.
13	Review the configuration summary in the Completing the Configuration Wizard window. If the configuration summary is satisfactory, click Finish to display a list of tasks the Configuration Wizard performs, based on the configuration information you specified. Result: The SnapManager Configuration Wizard displays the task list to be used.
14	Click Start Now to migrate your databases and their transaction logs and SnapInfo files to the LUNs you specified. Result: The SnapManager Configuration Wizard moves the databases and transaction logs to their specified LUNs and displays a task check-off list. Note If you are moving the location of Exchange databases in this step, it could take some time to complete.
15	Create a SnapManager backup immediately. For information about creating a SnapManager backup, see “Backing Up with SnapManager Backup” on page 83.

Moving databases using the Configuration Wizard

The SnapManager 3.1 for Microsoft Exchange Configuration Wizard enables you to choose which LUNs will store your Exchange databases when you complete the wizard. You use the Where to Move Databases window to perform these tasks:

- ◆ Moving a storage group to a LUN
For details, see “[Moving storage groups to a LUN](#)” on page 77.
- ◆ Moving an individual database to a LUN
For details, see “[Moving individual databases to a LUN](#)” on page 77.
- ◆ Changing the location of a storage group or database
For details, see “[Changing the location of a storage group or database](#)” on page 78.
- ◆ Viewing the full path for your storage groups or databases
For details, see “[Viewing the full path for your database files](#)” on page 78.

Note

The list of available drives changes as you make choices that rule out other choices.

Moving storage groups to a LUN: To put an entire storage group on a single LUN, complete the following steps.

Step	Action
1	In the upper storage group list, select the storage group you want to move.
2	In the Disk List, select the drive letter for the LUN or local disk you want to move the storage group to.
3	Click move (<=>). Result: The selected storage group and disk are now associated, and the storage group files will be moved to that disk when the Configuration Wizard moves your data.

Moving individual databases to a LUN: To move an individual database to a LUN, complete the following steps.

Step	Action
1	In the upper storage group list, expand the storage group containing the database you want to move and select the database you want to move.
2	In the Disk List, select the drive letter for the disk you want to move the database to.
3	Click move (<=>). Result: The selected database and disk are now associated, and the database file will be moved to that disk when the Configuration Wizard moves your data.

Changing the location of a storage group or database: To change the location of a storage group you already associated with a LUN or local disk, complete the following step.

Step	Action
1	In the Database Location Results, highlight the storage group you want to move and click Reconfigure. Result: The selected storage group or database is returned to the list of unconfigured databases and you can reassociate it with any available disk.

Viewing the full path for your database files: To view the full path for your database or storage group files, complete the following steps.

Step	Action
1	Highlight a storage group or database in the Database Location Results and click Details. Result: The Storage Group Properties window is displayed for the selected storage group.

Step	Action
2	To see the file path for the databases in this storage group, highlight the database and click Details. Result: The current paths and file names for the selected database are displayed, along with the new paths and file names if the location of the selected database has changed.

Moving transaction logs using the Configuration Wizard

The SnapManager 3.1 for Microsoft Exchange Configuration Wizard enables you to choose which LUNs will store your Exchange transaction logs when you complete the wizard. You use the Where to Move Transaction Logs window to perform these tasks:

- ◆ Moving a transaction log file to a LUN
For details, see “[Moving transaction logs to a LUN](#)” on page 79.
- ◆ Changing the location of a transaction log file
For details, see “[Changing the location of a transaction log files](#)” on page 80.
- ◆ Viewing the full path for your transaction logs
For details, see “[Viewing the full path for your transaction log files](#)” on page 80.

Note

The list of available drives changes as you make choices that rule out other choices.

Moving transaction logs to a LUN: To put the transaction logs for a storage group on a disk, complete the following steps.

Step	Action
1	In the upper storage group list, select the storage group whose transaction logs you want to move.
2	In the Disk List, select the drive letter for the LUN or local disk you want to move the transaction logs to.

Step	Action
3	Click move (<=>). Result: The transaction logs for the selected storage group and LUN are now associated, and the transaction log files will be moved to that LUN when the Configuration Wizard moves your data.

Changing the location of a transaction log files: To change the location of transaction log files you already associated with a LUN, complete the following step.

Step	Action
1	In the Transaction Logs Location Results, highlight the storage group for the transaction files you want to move and click Reconfigure. Result: The selected storage group is returned to the list of unconfigured transaction logs and you can reassociate it with any available LUN or local disk.

Viewing the full path for your transaction log files: To view the full path for your transaction log files, complete the following step.

Step	Action
1	Highlight a storage group in the Transaction Logs Location Results and click Details. Result: The Properties window is displayed for the selected storage group. The current paths and file names for the transaction logs for the selected database are displayed, along with the new paths and file names if the location of the transaction log files has changed.

About the SMTP and MTA queue location

The SMTP and MTA queues are used by Exchange. Usually, the location of these files does not matter, as long as they do not reside on the same LUN as the Exchange databases.

For stand-alone systems, the SMTP and MTA system files can be placed on any disk or LUN that does not contain Exchange databases (the default location of the original local installation disk is acceptable). For Windows clusters, they must be moved to a shared LUN that does not contain Exchange databases.

About this chapter This chapter describes how to back up Exchange database storage sets with SnapManager Backup.

Topics in this chapter This chapter discusses the following topics:

- ◆ [“Understanding SnapManager Backup”](#) on page 84
- ◆ [“Tips for using SnapManager Backup”](#) on page 91
- ◆ [“Understanding the backup naming conventions”](#) on page 95
- ◆ [“Performing a backup”](#) on page 97

Understanding SnapManager Backup

What SnapManager Backup does

SnapManager Backup performs a full online backup of the Exchange storage groups' databases and transaction logs. SnapManager Backup uses snapshot functionality to create real-time, online, read-only copies of Exchange databases. After the selected storage groups (Stores) are safely backed up, the transaction logs that are already committed to the databases captured in the backup are deleted.

Tasks a SnapManager backup performs

The following tables outline the steps SnapManager Backup takes when creating a backup, for Windows 2000 Server and Windows Server 2003.

Note

The following tasks are performed in their entirety for each volume containing the storage groups to be backed up. If two separate volumes are involved, the task list is performed once for the first volume, then again for the second volume.

SnapManager Backup tasks for Windows 2000 Server:

Task	Process
1	Check SnapManager license.
2	Rename most recent SnapInfo directory, if required.
3	Rename most recent snapshot, if required.
4	Create SnapInfo directory for this backup.
5	Initiate online backup.
6	Back up database files.
7	Create database snapshot.
8	Back up transaction logs.
9	Truncate transaction logs.
10	Create SnapInfo snapshot.
11	Delete SnapInfo snapshots for the deleted backups.

Task	Process
12	Delete any specified older backups.

SnapManager Backup tasks for Windows Server 2003:

Task	Process
1	Check SnapManager license.
2	Rename most recent SnapInfo directory, if required.
3	Rename most recent snapshot, if required.
4	Create SnapInfo directory for this backup.
5	Initiate VSS backup.
6	Gather Exchange metadata and start VSS snapshot set.
7	Add all required volumes to VSS snapshot set.
8	Create volume shadow copy. (The transaction logs are backed up and truncated during this step).
9	Create SnapInfo snapshot.
10	Delete SnapInfo snapshots for the deleted backups.
11	Delete any specified older backups.

What the SnapManager backup set is

A SnapManager backup set, sometimes called just the “backup set”, consists of all data that you would need to be able to perform a restore, regardless of whether this data exists on the same LUNs or volumes. The backup set contains the following items:

- ◆ Exchange databases
- ◆ Exchange transaction logs
- ◆ SnapInfo directory

What storage group sets are

Exchange storage groups (Stores) stored on a single volume that belong to the same Exchange server are referred to collectively as a storage group set. When you select an Exchange storage group for backup, all storage groups composing its storage group set are automatically selected for backup.

SnapManager Backup backs up the complete set of storage groups—all of which constitute the storage group set—in parallel. (Thus, these storage groups share the same backup name and date-time stamp.)

Note

Even though the backup includes all storage groups in the storage group set, you can still restore the storage groups individually.

How partial backups work

If the backup of some of the storage groups or databases in the storage group set fails, those in the set that were backed up successfully can still be restored. Because each database constitutes its own backup, or file, it is restored discretely, independent of backups of the others in its storage group set, even though the backup of all databases and storage groups in the set was synchronized.

Volume-wide backup

When a snapshot is taken of a LUN for a SnapManager backup, the entire volume is captured in that snapshot. However, that backup is valid only for that Exchange server. If data from other Exchange servers resides on the same volume, it is not restorable from that snapshot.

Backup of multiple volumes

SnapManager Backup performs backups in parallel on all LUNs that belong to the same Exchange server and share a single filer volume. When a storage group set spans more than one volume, the resulting backup set contains more than one database snapshot but is still restorable as a single entity.

Storage group icons

To help you keep track of which of your storage groups share a volume, the storage group icons on the SnapManager Backup and Verification tab are color-coded by the volume they reside on.

Note

If a storage group spans multiple volumes, its icon contains three colors.

SnapManager Backup and the SnapInfo directory

The SnapInfo directory contains the information about each storage group set created by SnapManager Backup. A subdirectory under the SnapInfo directory is created for each backup set. Each backup SnapInfo subdirectory contains the transaction logs backed up as part of that backup, as well as the recovery information for that specific snapshot.

By default, the SnapInfo directory is on the LUN that stores the Exchange transaction log files, but this is not a requirement. The SnapInfo directory cannot reside on the same LUN that stores the Exchange database files.

Every time a SnapManager backup is created, a new backup set subdirectory is created under the SnapInfo directory and is populated with the appropriate information and data. A complete backup set consists of this SnapInfo subdirectory and the corresponding snapshots of the LUNs that store the Exchange databases and transaction logs.

How backup management groups are used

Backup management groups are used to determine which backups are targeted for automatic deletion and verification. For example, when you run or schedule a backup, you can specify how many of the most recent backups you want to retain. Only backups of the specified backup management group are deleted.

SnapManager provides the following backup management groups:

- ◆ Standard
- ◆ Daily
- ◆ Weekly

Using the Standard backup management group for all backups results in the same behavior as earlier versions of SnapManager for Microsoft Exchange.

Note

The backup management group does not depend on or enforce how often that backup is performed. It only enables you to group your backups for management.

Example: Suppose your company wants to take regular backups between 7:30 a.m. and 7:30 p.m. You want to keep the last backup of the day and keep it around for a few weeks, and you want to keep one backup per week for several months for archiving.

To achieve this using backup management groups, you could use the Standard backup management group for the backups during the day, and use a separate backup job to create one backup in the Daily management group at the end of the day. Then, once a week, you could use another job to create a backup in the Weekly backup management group.

You could then decide how many backups to retain independently for each backup management group. For example, you could keep 10 Standard backups, 7 Daily backups (one week's worth) and 4 Weekly backups (one month's worth).

If your Daily or Weekly backup job failed for any reason, you could promote the most recent successful Standard backup to replace the Daily or Weekly backup by changing its backup management group. For information about how to change a backup's management group, see "[Changing the backup management group](#)" on page 88.

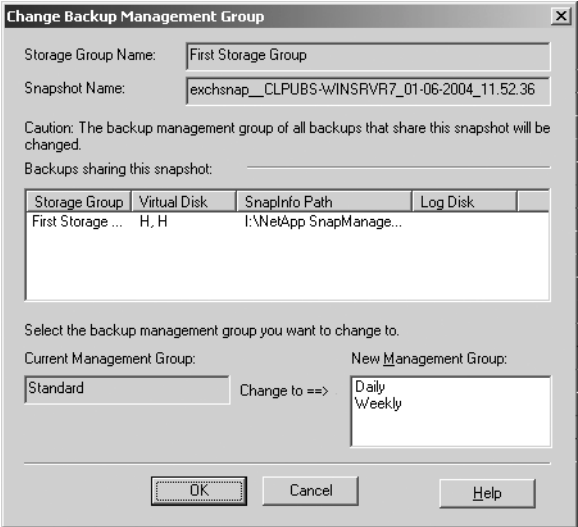
Changing the backup management group

To change the backup management group, complete the following steps.

Note

The window shown in this procedure is for the Exchange 2000 or 2003 version of SnapManager. If you are using Exchange 5.5, some of the text you see is slightly different. However, the actions you take to perform these steps are the same.

Step	Action
1	In the SnapManager main window, select the SnapManager Restore tab.
2	Select (left-click) the backup whose management group you want to change.

Step	Action
3	Right-click the backup and select Change Management Group from the pop-up menu. Result: The Change Backup Management Group dialog box is displayed. 
4	Review the backups listed in the Backups Sharing This Snapshot list. Note_____ The backup management group for all these backups is changed if you complete this operation. This is because they share a common snapshot. _____
5	In the New Management Group list, select the backup management group you want to change to. Note_____ When you change a backup's backup management group, you also change that backup's name, because the name includes the backup management group. _____

Step	Action
6	Click OK. Result: The backup management group for this backup and all backups listed in the All Backups Sharing This Snapshot list is changed. Note_____The report for the backup management group change is in the Miscellaneous report directory.

Tips for using SnapManager Backup

Importance of the initial backup

At the end of the database and transaction log migration process, SnapManager prompts you to make an immediate backup of the Exchange databases. Making an immediate backup of the Exchange databases is critical because previous backups are not valid.

Recommendations for scheduling backups and verifications

The more often you create SnapManager backups, the fewer Exchange transaction logs there are to be played forward at restore time, resulting in a faster restore. However, for best results, observe the following recommendations for scheduling backups and verifications:

- ◆ Do not schedule any SnapManager operations to overlap each other.
Only one SnapManager operation can be running on the same machine at the same time.
- ◆ Do not schedule a backup to occur while a verification is being performed, even if the verification is performed on a remote verification machine.
This can result in a backup that cannot be deleted easily. For more information about this problem, see “[Problem deleting backups due to busy snapshot error](#)” on page 116.
- ◆ Do not schedule verifications on the Exchange server during peak usage hours.
The verification process is CPU-intensive and could degrade Exchange performance if run on the Exchange server during peak usage hours.

An easy way to conform to the preceding recommendations is to schedule your backups to occur during peak usage hours, and then use the off-peak hours to perform verifications.

Note

If you are scheduling backups in a Windows cluster, schedule them on only one node. If the Exchange virtual server fails over to another node, the node that takes over that virtual server performs the backup as scheduled. If the entire node fails, you need to set up the backup schedule again.

Backups during cluster failovers

If a Windows cluster move group or a filer cluster failover occurs during a SnapManager backup, the backup fails, and you need to restart the backup after the move group or failover is complete.

Using the page zeroing and deleted item retention Exchange features

Exchange includes the following two optional features that depend on the complete read of every database page during a backup:

- ◆ **Page zeroing**

Used by high-security installations, this feature provides the ability to zero out database pages that were deleted.

Note

This feature is not available for Exchange 5.5.

- ◆ **Deleted item retention**

This feature enables you to mark items for deletion after they are backed up.

Because SnapManager uses snapshot technology, and therefore does not read every page during a backup, these features are not triggered when only SnapManager is used to perform backups.

Note

The deleted item retention feature is invoked when you run SnapManager on a host system running Windows Server 2003.

You can cause these Exchange features to be triggered by scheduling a periodic backup using a standard backup utility, such as NTBackup.

Caution

Make sure that the backup you use for this purpose is a copy or differential backup. Performing any other type of backup causes existing SnapManager backups to become unusable for up-to-the-minute restores.

In addition, make sure that the extra backup is not performed at the same time as a SnapManager backup.

What to do if your SnapManager backup fails

If your SnapManager backup fails, check the backup report for details about what SnapManager was trying to do when the failure occurred. You can also review the following list of common backup failures:

- ◆ **Snapshot limit reached**

If any of the volumes containing the LUNs being backed up reach the snapshot limit of 255, whether those snapshots were created by SnapManager or not, SnapManager backup fails. For more information about the snapshot limit, see [“Maximum number of snapshots you can retain”](#) on page 11.

Note

Automatic backup deletion is performed only after a successful backup is complete. Therefore, you must be able to create new snapshots before you begin a new backup procedure.

- ◆ SnapInfo directory being accessed
Because a SnapManager backup might include renaming a SnapInfo subdirectory and Windows does not allow a directory name to be changed while it is being accessed, accessing the SnapInfo directory with a tool like Windows Explorer could cause the backup to fail. Make sure that you do not hold any exclusive access to the SnapInfo directory on the Exchange host when a backup is performed.
- ◆ SnapInfo directory out of space
Expand the LUN that contains the SnapInfo directory.

Note

When you expand a LUN, make sure that sufficient space remains in the volume for snapshot creation, so that SnapManager can continue to function correctly. For more information about volume sizing, see [“Volume size calculation”](#) on page 38.

- ◆ “Data does not match” error
You made changes to your Exchange data store since SnapManager was started. You can refresh your view by pressing F5, or you can restart SnapManager.
- ◆ “Busy snapshot” error
If you initiate a backup when a LUN backed by snapshot exists, the result is a snapshot that cannot be deleted; when you try, you get a “busy snapshot” error and Event 249 is logged by SnapDrive in the event log. This can cause SnapManager backups to fail.
For information about recovering from this error, see [“Problem deleting backups due to busy snapshot error”](#) on page 116.
- ◆ Snapshot already exists
 - ❖ The system clock on the host running SnapManager might not be synchronized with the clock on the filer. These two clocks must be synchronized in order for SnapDrive to function correctly.

- ❖ If a SnapMirror replication is running when you attempt to initiate a SnapManager backup, the backup can fail. You can avoid this problem by making sure that any SnapMirror replications have enough time to complete before you initiate another SnapManager backup.
- ◆ SnapManager server initialization failed
Either of the following circumstances might cause this error to occur:
 - ❖ You have exited the SnapManager application, but SnapManager.exe or smesrvr.exe processes are still running. To correct this problem, terminate any orphaned SnapManager processes.
 - ❖ The permissions associated with the SnapManager service account, or the service account itself, have been changed. In this case, SnapManager might not function correctly.

What the minimum unit of backup is

Although SnapManager 3.1 for Microsoft Exchange supports individual database restore, the minimum unit of backup, or the smallest object you can back up, is an Exchange storage group. SnapManager enables you to back up individual storage groups, but for easiest administration, it is best to back up all the storage groups in the same Exchange server at the same time.

Understanding the backup naming conventions

About the backup naming conventions

Older versions of SnapManager for Exchange (before 3.0) always appended the string “recent” to the most recently created snapshot. This was to allow external scripts, for example archive scripts, to be able to operate on the most recent snapshot.

With the addition of the Run Command After Operation feature, appending “recent” is no longer necessary because the scripts can be integrated into the backup process.

SnapManager 3.1 for Microsoft Exchange has two backup naming convention options:

- ◆ Unique naming convention
- ◆ Generic naming convention

The generic naming convention is identical to the naming convention used in older SnapManager versions, and is the default.

The unique naming convention causes all backup names to contain a date-timestamp, including the most recently created one. This removes the need for the rename of the snapshot when the next backup is created.

Note

NetApp recommends that you select the unique naming convention option unless you have legacy scripts that require the presence of a backup with “recent” in its name.

You need to use the Options > Backup Setting menu to select this option, because, for backward compatibility, it is not selected by default.

For more information about the Run Command After Operation feature, see [“Using Run Command After Operation to archive automatically”](#) on page 167.

Setting the backup naming convention option

To set the backup naming convention option, complete the following steps.

Step	Action	
1	From the SnapManager main menu, select Options > Backup Setting. Result: The Backup Setting window is displayed.	
2	If you want...	Then...
	All backup names to contain the date-timestamp, including the most recently created one (recommended)	Select the Use Unique Naming Convention radio button.
	The most recently created snapshot name to contain the string “recent”, because your existing scripts use the old naming convention	Select the Use Generic Naming Convention radio button.

Performing a backup

Ways to access SnapManager Backup

You can create or schedule a SnapManager backup in two ways:

- ◆ From the SnapManager Backup Wizard
For details, see “[Backing up using the SnapManager Backup Wizard](#)” on page 98.
- ◆ From the SnapManager Backup tab
For details, see “[Backing up using the Backup tab](#)” on page 99.

Information you need to perform a backup

You need to provide the following information to perform a SnapManager backup:

- ◆ What storage groups (Stores) you want to back up
- ◆ What backup management group you want to assign to this backup
For details, see “[How backup management groups are used](#)” on page 87.
- ◆ Whether you want to use the unique naming convention
For details, see “[Understanding the backup naming conventions](#)” on page 95.
- ◆ Whether you want to automatically delete the oldest backups of this backup management group
For details, see “[Deleting backups automatically](#)” on page 118.
- ◆ Whether you want to retain up-to-the-minute restore ability for any backups from other backup management groups that are older than backups you will be deleting
For details, see “[Option to retain up-to-the-minute restore ability](#)” on page 115.
- ◆ Whether you want to verify the backup databases (and, for Windows 2000 and 2003, transaction logs) after the backup is created
Although it is possible to restore from an unverified backup, NetApp strongly recommends that you restore only from verified backups.
- ◆ If the volumes you are backing up to are SnapMirror sources, whether you want the mirror to be updated after the backup. For more information about this option, see “[How SnapMirror replication works](#)” on page 147.
- ◆ Whether you want to run a command after the backup is complete

For details, see [“Using Run Command After Operation to archive automatically”](#) on page 167.

- ◆ Whether you want to run the backup now or schedule it for later
- ◆ If you want to schedule the backup to run later, the job scheduling information

Backing up using the SnapManager Backup Wizard

To back up the Exchange databases using the SnapManager Backup Wizard, complete the following steps.

Step	Action
1	In the SnapManager for Microsoft Exchange main window, click the SnapManager Backup Wizard icon. Result: The SnapManager for Microsoft Exchange Backup Wizard Welcome Window appears.
2	Follow the instructions in the Backup Wizard to initiate your backup. For a list of information you need to provide as you complete this step, see “Information you need to perform a backup” on page 97.
3	At the Completing the Backup Wizard dialog box, click Finish after you verify that all the settings in the window are true. Result: The Backup Status window appears.
4	In the Backup Status Window, click Start Now to start the backup. Result: The backup is performed and the snapshot is written to the volume. SnapManager Backup completes each task and checks it off on the list shown in the Backup Task List view. You can switch back and forth between the task check-off list and the progress report using the Switch buttons on either window. If the backup is successful, the Task window shows the check-off list with the tasks completed. Note _____ If Notification is enabled, e-mail is sent and the event is posted to the Windows event log. _____

Backing up using the Backup tab

To back up your Exchange data store using the Backup tab, complete the following steps.

Note_____The window shown in this procedure is for the Exchange 2000 or 2003 version of SnapManager. If you are using Exchange 5.5, some of the text you see is slightly different. However, the actions you take to perform these steps are the same.

Step	Action
1	In the SnapManager interface, select the Backup and Verification tab.
2	In the Backup window, select the storage groups (Stores) you want to back up.
3	In the Backup Management Group field, select the management group for the backup you want to create. For more information about backup management groups, see “How backup management groups are used” on page 87.

Step	Action	
4	If you want to delete older backups of this backup management group automatically, select the Delete Oldest Backups In Excess Of check box and select the number of backups of this backup management group you want to keep. For more information about automatic backup deletion, see “Deleting backups automatically” on page 118. Note_____ NetApp recommends that you select the Delete Oldest Backups In Excess Of check box to manage your snapshots.	
5	If...	Then...
	You want to verify the backup immediately after the backup is complete	Select the Verify Backed Up Databases and Transaction Logs check box.
	You want to verify your backup later	Do not select the Verify Backed Up Databases and Transaction Logs check box. See “Deferred verification” on page 109. Note_____ Although it is possible to restore from an unverified backup, NetApp strongly recommends that you restore only from verified backups.
6	If you want to run a command after the backup is complete, select the Run Command After Operation check box. This is usually done to archive backups. For details, see “Using Run Command After Operation to archive automatically” on page 167.	
7	If your volume is a SnapMirror source volume and you do not want the destination volume to be updated after this backup is complete, clear the Update SnapMirror After Operation check box.	

Step	Action	
8	If...	Then...
	You want to run your backup immediately	Click Backup Now and proceed to Step 12 . Result: The Backup Status window appears, showing the Task list.
	You want to defer your backup until later	Click Schedule to use the Windows Task Manager to schedule your backup and proceed to the next step.
9	In the Schedule Jobs window, name your backup job, provide the user ID and password for the job, then click OK. Note_____ If this name already exists as a Windows scheduled task and you want to replace it with a new job, select the Replace if it Exists check box, then click OK. _____ Result: The Schedule Job window is displayed.	
10	In the Schedule Job window, use the Schedule tab to specify the parameters of your job schedule: ◆ When the job is to run ◆ If you want the job to repeat, at what frequency	
11	After you schedule your job, click OK. Result: The backup job runs at the times you specified in the Schedule Task window. The backup process is complete. Note_____ You can use the Control Panel to modify the schedule or cancel the scheduled job. _____	

Step	Action
12	In the Backup Status window, click Start Now to back up the selected storage groups. Result: The backup is performed and the snapshot is written to the volume. SnapManager Backup completes each task and checks it off on the list shown in the Backup Task List view. You can switch back and forth between the task check-off list and the progress report using the Switch buttons on either window. If the backup is successful, the Task window shows the check-off list with the tasks completed. Note_____ If Notification is enabled, e-mail is sent and the event is posted to the Windows Application event log. _____

About this chapter This chapter describes how to manage backups created using SnapManager Backup.

Topics in this chapter This chapter discusses the following topics:

- ◆ “[Verifying databases](#)” on page 104
- ◆ “[Deleting backups](#)” on page 115

Verifying databases

What database verification provides

Database verification uses a Microsoft Exchange utility that verifies that the databases in a backup have not incurred physical-level corruption. For Exchange 2000 and 2003, verification also checks that the transaction logs associated with the backup have not incurred physical-level corruption.

For more information about physical and logical level corruption, see your Microsoft Exchange documentation.

Caution

NetApp strongly recommends that you restore only from backups whose databases have been verified.

Methods of verifying backups

SnapManager provides the following ways to verify your backup databases:

- ◆ You can verify the databases at the same time the backup is created with SnapManager Backup.

This method is simple and makes sure that all your backups are verified. However, it significantly increases the time required to complete the backup. In addition, because the Microsoft utility used for the verification is CPU-intensive, performing the verification on the Exchange host system during peak usage could affect Exchange performance.
- ◆ You can manually verify the databases in one or more backups.

For more information about manual database verification, see “[Verifying backup databases](#)” on page 106.
- ◆ You can schedule the databases in a backup to be verified at some later time.

This method allows database verification to be done when it does not affect performance or delay later backups. However, if the backup is needed for a restore before the verification is done, you must either delay the restore for the verification or restore an unverified backup.

For more information about scheduling database verification to happen later, see “[Deferred verification](#)” on page 109.
- ◆ For all of the preceding methods, the verification can be done on the Exchange host system or on a remote verification system.

Performing the verification on a remote system minimizes the impact of verification on Exchange system resources and backup schedule.

For more information about setting up a remote verification system, see [“Remote verification”](#) on page 110.

Microsoft utility used to verify backup files

The Microsoft utility used to verify SnapManager backup databases and transaction logs verifies page-level integrity of the databases. The utility used depends on the version of Exchange you are using:

- ◆ Exchange 2000 or 2003

For Exchange 2000 or 2003, SnapManager uses the Microsoft utility `eseutil` to verify the Exchange database files in a backup set. This utility is installed automatically with Microsoft Exchange in the `\Exchsrvr\bin` directory.

- ◆ Exchange 5.5

For Exchange 5.5, SnapManager uses the Microsoft utility `esefile` to verify the Exchange database files in a backup set. This utility is in the Support folder of Exchange 5.5 SP4 and must be manually installed.

Backup verification status

SnapManager Restore shows you a list of the backups that have been taken. For each backup, the date and time of the backup is displayed, as well as one of these symbols:

- ◆ Green check-mark

The databases in backups shown with this symbol are verified.

- ◆ Yellow question mark

The databases in backups shown with this symbol are not verified.

- ◆ Red exclamation mark

The databases in backups shown with this symbol failed verification and cannot be restored.

- ◆ File with a red X (Exchange 2000 or 2003 only)

The databases in backups shown with this symbol are verified, but the transaction logs for the backup failed verification. If you need to restore from backups with this symbol, contact NetApp Global Services.

Note

You can also determine whether the transaction logs for a specific backup have been verified by opening the Restore tab and selecting that backup. The transaction log verification status is displayed (for Exchange 2000 and 2003 only) as part of the backup information in the right pane.

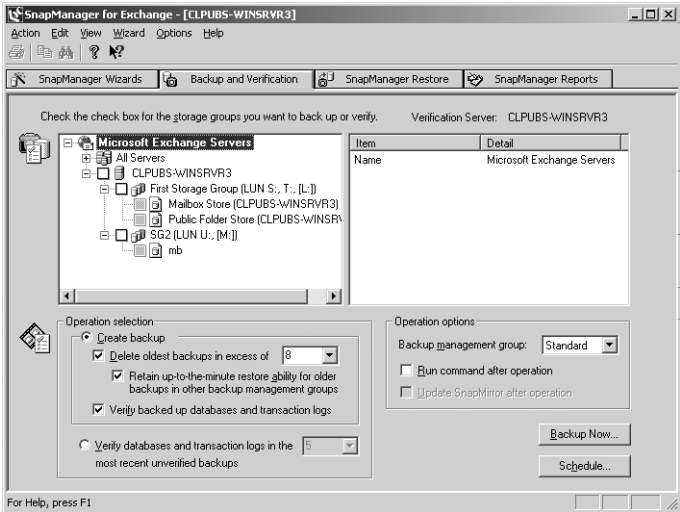
Verifying databases

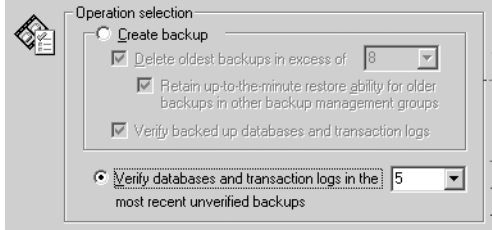
Verifying backup databases

Running or scheduling verification

To run or schedule database verification, complete the following steps *from the production Exchange server* (not from the remote verification server).

Note—
The windows shown in this procedure are for the Exchange 2000 or 2003 version of SnapManager. If you are using Exchange 5.5, some of the text you see is slightly different. However, the actions you take to perform these steps are the same.

Step	Action
1	On the production Exchange server, click the Backup and Verification tab. 
2	Select the storage group (Store) you want to run the verification on.

Step	Action
3	Select the Verify Databases and Transaction Logs in the Most Recent Unverified Backups option. 
4	Select how many of the most recent unverified backups you want to verify. Note _____ Only unverified backups are counted. For example, if you select to verify the two most recent unverified backups, and the most recent backup's databases have already been verified, then the two previous backups are verified.
5	In the Backup Management Group field, select the backup management group of the backups you want to verify. If you want to verify the most recent backups regardless of their backup management group, select All.
6	If you want to run a command after the verification is complete, select the Run Command After Operation check box. This is usually done to archive backups. For details, see “Running a command after backup or verification” on page 169.
7	If your volume is a SnapMirror source volume and you do not want the destination volume to be updated after this verification is complete, clear the Update SnapMirror After Operation check box.

Step	Action
8	Click Verify Now, and on the Backup Status window, click Start Now. Note_____To schedule the verification for later, click Schedule instead and follow the prompts in the dialog boxes. Result: Verification is run on the databases in the backup you selected. If verification is successful, a dialog box appears telling you so. If any backup database fails verification, delete that backup and create another.

Deferred verification

Options for deferring verification

Running verification on a production Exchange server using the Microsoft verification utility is CPU-intensive and also involves substantial filer activity. For this reason, it can degrade Exchange client responsiveness during work hours.

By default, SnapManager verifies a backup immediately after the backup is completed. However, SnapManager provides the following options that enable you to separate the process of verification from the backup itself:

- ◆ You can defer verification.

This is done by selecting the correct option in the SnapManager Backup Wizard or the Backup tab.

For details, see “[Ways to access SnapManager Backup](#)” on page 97 or “[Backing up using the Backup tab](#)” on page 99.

- ◆ You can run database verification from another server.

See “[Remote verification](#)” on page 110.

Remote verification

Benefit of remote verification

Database verification is CPU-intensive for the host running the verification. To prevent verification from affecting the performance of your production Exchange server, you can run verification on another computer.

Overview of remote verification

Remote verification is performed using the same mechanisms used for local verification, except that the verification is performed on a different host than the one that initiated the backup. This is why you need SnapDrive and SnapManager installed on your remote verification server, as well as connectivity to the filer (FCP or iSCSI).

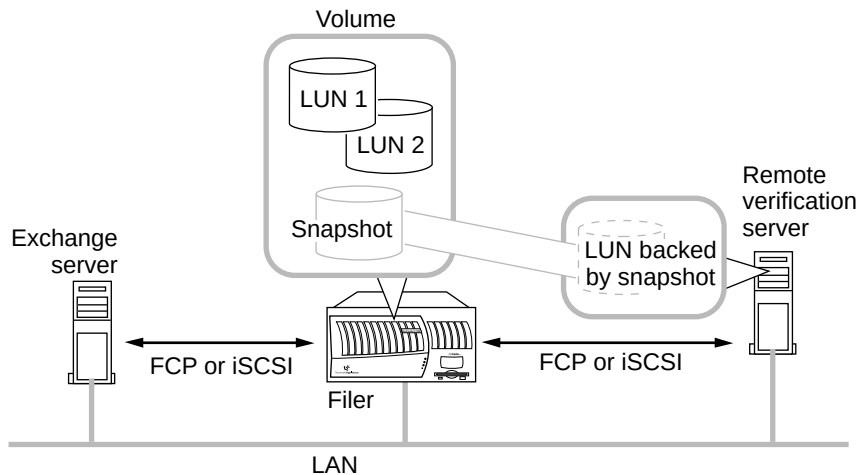
The process followed for remote verification is outlined in the following table.

Task	Process
1	The SnapManager backup with verification (or verification only) is initiated on the primary SnapManager host, which is configured to run verifications on the remote verification server.
2	The primary SnapManager host contacts the remote verification server and initiates the verification job.
3	The remote verification server uses SnapDrive to create a LUN backed by the snapshot containing the databases to be verified.
4	The remote verification server performs the database verification on the LUN backed by snapshot.
5	When the remote verification server completes the verification, it sends the results back to the primary SnapManager host.

Note

Whether you run verification remotely or locally, the verification is performed on a LUN backed by snapshot. If you take a snapshot of the same volume while a LUN backed by snapshot exists, you create a “busy snapshot,” which might cause problems when you attempt to delete some snapshots. For this reason, you must be careful not to schedule backups while a verification is in progress.

The connectivity required to perform remote verification is shown in the following diagram:



Requirements for a remote verification server for Exchange 2000 or 2003

To run remote verification for Exchange 2000 or 2003, your remote Windows system must meet the following requirements:

- ◆ SnapDrive must be installed.

Caution

Do not try to connect the Exchange server's LUNs to the remote verification server.

- ◆ If you are using iSCSI to connect to the filer on the remote verification server, an iSCSI connection must be created.
- ◆ SnapManager must be installed.

You need to install, but not configure, SnapManager. You can use the same user account you used for the production server.

- ◆ The correct Microsoft binaries must be installed.

Microsoft requires that the Microsoft Exchange System Management Tools be installed on remote verification machines for licensing compliance. However, the minimum configuration required by SnapManager is to copy the following files from the Exchsrvr\bin directory on your Exchange server to the verification server:

- ❖ eseutil.exe
- ❖ ese.dll

- ❖ jcb.dll
- ❖ exosal.dll
- ❖ exchmem.dll

For more information about performing verification on a computer that does not have Exchange installed, see Microsoft KB article 244525.

Note

The version of `eseutil` must match the version of Exchange. When you apply an Exchange service pack to the production server, you *must* copy over a new version of `eseutil` at the same time, or else verification cannot function correctly.

Requirements for a remote verification server for Exchange 5.5

To run remote verification for Exchange 5.5, your remote Windows system must meet the following requirements:

- ◆ SnapDrive must be installed.

Caution

Do not try to connect the Exchange server's LUNs to the remote verification server.

- ◆ If you are using iSCSI to connect to the filer on the remote verification server, an iSCSI connection must be created.
- ◆ SnapManager must be installed.
You need to install, but not configure, SnapManager. You can use the same user account you used for the production server.
- ◆ The `esefile` utility must be copied from the Support folder in Exchange 5.5 SP4 to the SnapManager installation directory.

Note

The version of `esefile` must match the version of Exchange. When you apply an Exchange 5.5 service pack to the production server, you *must* copy over a new version of `esefile` at the same time, or else verification cannot function correctly.

Designating a remote verification server

To designate a remote verification server, complete the following steps *on the production Exchange server*.

Step	Action
1	On the production Exchange server, from the SnapManager main menu, select Options > Database Verification Setting.
2	Enter or browse to the name of the system you want to run verification on and click OK. Result: From now on, until you change this setting, verification is run from the system you selected.

Overriding database verification

Overriding database verification during restore

NetApp strongly recommends that you restore only from verified backups. However, if for some reason you do not have a verified backup available when you need to restore and you do not want to wait for a verification to be complete before restoring, you can override the verification requirement and restore directly from an unverified backup.

Caution—————
NetApp strongly recommends that if you must restore from an unverified backup, that you perform an up-to-the-minute restore. This way, if you discover later that the backup was corrupted, you can restore from another backup to recover.

To override the verification requirement, complete the following steps.

Step	Action
1	From the SnapManager main menu, select Options > Database Verification Setting.
2	Select the Override Verification tab.
3	Select the Override Database Verification Requirement for Restore check box. Result: You can restore from unverified backups until you reset this option or until you exit SnapManager.

Deleting backups

Methods of deleting backups

SnapManager provides the following ways to manage and delete backups:

- ◆ You can manage the number of backups stored and delete older backups automatically using the Delete Oldest Backups In Excess Of feature in the SnapManager Backup window.

This is the recommended method. For details, see “[Deleting backups automatically](#)” on page 118.

- ◆ You can use the Delete Backup option on the Action menu.

Note

This is the only way to delete snapshots created by SnapManager Restore.

For details, see “[Deleting backups using the Action menu](#)” on page 120.

- ◆ You can delete selected backups individually.

For details, see “[Deleting selected backups](#)” on page 127.

Note

Do not use SnapDrive or the filer administration tools to delete snapshots created by SnapManager. Doing so will leave behind unwanted data that cannot be removed.

Option to retain up-to-the-minute restore ability

When you delete backups that are not the oldest backups in your backup list, and the corresponding transaction logs are also deleted, the older remaining backups are no longer available for an up-to-the-minute restore. This is because the logs are no longer contiguous from when the older backup was taken to the present time.

This can happen when you are deleting backups of a particular backup management group.

SnapManager for Microsoft Exchange enables you to preserve the logs in this case, thus retaining the ability to use the older backups in an up-to-the-minute restore.

Note

If you know you will not need to perform an up-to-the-minute restore from the older backups, you should allow the logs to be deleted, to free up more space on the filer holding the backups.

Example: Suppose that you have the following backups stored:

Oldest	exchsnap_WINSRV3_01_05_2004_19.05.37_Daily
	exchsnap_WINSRV3_01_06_2004_08.23.14
	exchsnap_WINSRV3_01_06_2004_10.22.19
	exchsnap_WINSRV3_01_06_2004_12.18.58
Newest	exchsnap_WINSRV3_01_06_2004_14.28.03

Now, you perform a Standard backup, and specify that only the four most recent Standard backups be retained. After this backup is complete, the oldest Standard backup is deleted, and the daily backup becomes point-in-time only:

Oldest	exchsnap_WINSRV3_01_05_2004_19.05.37_Daily ③
	~~exchsnap_WINSRV3_01_06_2004_08.23.14 ②~~
	exchsnap_WINSRV3_01_06_2004_10.22.19
	exchsnap_WINSRV3_01_06_2004_12.18.58
	exchsnap_WINSRV3_01_06_2004_14.28.03
Newest	exchsnap_WINSRV3_01_06_2004_16.23.48 ①

- ① New Standard backup created
- ② Oldest Standard backup deleted
- ③ Daily backup becomes point-in-time only

To avoid this situation, you can use the option to retain up-to-the-minute restore ability for older backups, at the cost of using more space on your filer for the logs that are not deleted.

Problem deleting backups due to busy snapshot error

If you attempt to delete a backup and you get an error message saying that the snapshot is busy and cannot be deleted, you have a backup that was taken of a LUN backed by another snapshot. In this case, you need to delete the more recently taken backup before the older backup can be deleted.

To see if you have busy snapshots, you can view your snapshots in FilerView or use the filer `snap list` command. For more information about deleting busy snapshots, see the *System Administration Block Access Guide* for your version of Data ONTAP.

Note

To avoid this situation in the future, make sure that you do not take backups while you have any LUNs backed by snapshots (for example, during a verification or while archiving from a LUN backed by a snapshot). For more information about scheduling your SnapManager tasks, see [“Recommendations for scheduling backups and verifications”](#) on page 91.

Deleting backups automatically

Management of backups using automatic deletion

When you use the SnapManager Backup feature to start or schedule a backup, you can also specify the number of backups of that storage group and backup management group to be retained.

To do so, you use the Delete Oldest Backups In Excess Of field on the Backup and Verification tab or SnapManager Backup Wizard. When you select this option, SnapManager Backup automatically deletes the oldest backups of the same backup management group that exceed the number you specify, after the backup is complete.

Note

This is the recommended method for managing the number of snapshots you store on your system.

For more information about backup management groups, see [“How backup management groups are used”](#) on page 87.

What is deleted by automatic deletion

Automatic deletion deletes only backups with the following characteristics:

- ◆ Its backup management group is the same as the type just created.
- ◆ It has the prefix “exchsnap” (database backup) or “eloinfo” (transaction logs backup).
- ◆ It is the oldest backup for this storage group of this type.
- ◆ If it is not deleted, there would be more backups of this backup retention level than you specified in the Delete Oldest Backups In Excess Of field.

When additional backups could be preserved

SnapManager does not count backups that failed verification when counting the number of stored backups. Therefore, more backups might be preserved than you specify in the Delete Oldest Backups In Excess Of field. This result could occur in cases such as the following example.

Example: In this example, two storage groups with the following database backups compose the storage group set:

- ◆ Storage Group A:
 - ❖ exchsnap_orbit3_07-23-2003_16.21.07 (old backup, good)
 - ❖ exchsnap_orbit3_recent (recent backup, good)
- ◆ Storage Group B:
 - ❖ exchsnap_orbit3_07-23-2003_16.21.07 (old backup, good)
 - ❖ exchsnap_orbit3_recent (recent backup, inconsistent, bad)

The user set the Delete Oldest Backups in Excess Of field to 1 to preserve only one of each backup data set, the most recent one.

To preserve one good backup for Storage Group B, SnapManager's delete process does not delete the snapshot exchsnap_orbit3_07-23-2003_16.21.07. So two backups for Storage group A remain instead of one.

Deleting backups using the Action menu

About using the Action menu to delete backups

You can use the Action menu's Delete Backup option to select a storage group set whose data set backups you want to delete. This menu option is available from the Backup and Verification tab or the SnapManager Restore tab.

If you use this method of deleting backups, the following facts are true:

- ◆ Backups for all storage groups (Stores) in the storage group set are deleted.
- ◆ The related SnapInfo directory and transaction logs are also deleted.
- ◆ You specify how many backup data sets are to be saved.

Older backup data sets of the same backup retention level in excess of that number are automatically deleted.

You can perform the following operations using this option:

- ◆ Delete backups
For details, see [“Deleting backups using the Action menu”](#) on page 120.
- ◆ Delete SnapInfo snapshots
For details, see [“Deleting backups using the Action menu”](#) on page 120.
- ◆ Delete restore snapshots
For details, see [“Deleting restore snapshots using the Action menu”](#) on page 124.

Deleting backups using the Action menu

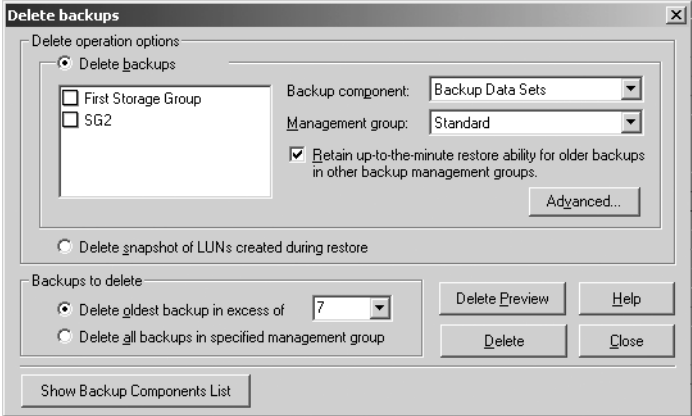
To delete the oldest backups of a particular storage group set and backup management group, complete the following steps.

Note

The Backup Component list is available to provide you with a list of the backup components on your SnapManager system. You cannot select an individual backup component for deletion using this list. To show the Backup Component list, click Show Backup Components List.

For information about deleting individual backups, see [“Deleting selected backups”](#) on page 127.

For information about how to delete snapshots created during a restore, see [“Deleting restore snapshots using the Action menu”](#) on page 124.

Step	Action
1	In the SnapManager main window, select Action > Delete Backup. Result: The Delete Backups window is displayed. 
2	Select the Delete Backups radio button.
3	Select the storage group set (Store) whose backups are to be deleted. Note By default, this dialog box deletes only backups containing all the selected storage groups. If you want to also delete backups containing only some of the selected storage groups, use the Advanced options. For more information about this option, see “Delete backup advanced option” on page 126.

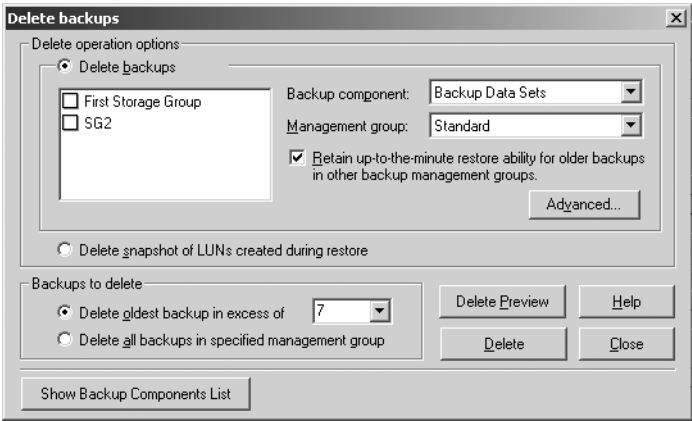
Step	Action
4	In the Backup Component drop-down list, select whether you want to delete a complete backup set or only the SnapInfo snapshot. Note _____ Usually you delete complete backup sets. However, if you need a way to free some space or reduce your snapshot count without deleting a SnapManager backup, you can delete SnapInfo snapshots without affecting the associated backup.
5	In the Management Group field, select the backup management group of the backups you want to delete. Note _____ If you want to delete backups from any backup management group, select All.
6	Using the Retain Up-to-the-Minute Restore Ability... check box, select whether you want to retain the ability to use any older backups that might remain after the deletion to perform up-to-the-minute restores. Note _____ If you selected All for the backup management group, this check box has no effect and is disabled. For more information about this option, see “Option to retain up-to-the-minute restore ability” on page 115.

Step	Action	
7	If you want to...	Then...
	Delete only the oldest backups in the specified backup management group	Select the Delete Oldest Backup In Excess Of radio button and specify how many of the newest backups in the specified backup management group you want to preserve.
	Delete all the backups in the specified backup management group	Select the Delete All Backups in Specified Management Group radio button. Caution ————— If you selected All for your backup management group, this action deletes all your SnapManager backups. —————
8	If you want to...	Then...
	See what backup components would be deleted with the parameters you have entered without deleting them	Click Delete Preview and proceed to Step 9 . Result: The Delete Backup Data Set Preview window is displayed. After a moment, a count and list of the backup components identified for deletion are displayed.
	Delete the backup components	Click Delete. Result: The backup components identified by your selections are deleted. When the deletion is complete, a status popup is displayed. You have completed this procedure.

Step	Action
9	If, after previewing the deletion, you want to delete the backup components listed in the preview, click Delete on the Delete Backup Data Set Preview window. Result: The backup components listed in the preview window are deleted.

Deleting restore snapshots using the Action menu

To delete snapshots created during previous restores, complete the following steps.

Step	Action
1	In the SnapManager main window, select Action > Delete Backup. Result: The Delete Backups window is displayed. 
2	Select the Delete Snapshot of LUNs Created During Restore radio button.

Step	Action	
3	If you want to...	Then...
	Delete only the oldest restore snapshots	Select the Delete Oldest Snapshots In Excess Of check box and specify how many of the newest restore snapshots you want to preserve.
	Delete all the restore snapshots	Select the Delete All Snapshots Created During Restore check box.
4	If you want to...	Then...
	See what restore snapshots would be deleted without deleting them	Click Delete Preview and proceed to Step 5 . Result: The Delete Backup Data Set Preview window is displayed. After a moment, a count and list of the restore snapshots identified for deletion are displayed.
	Delete the restore snapshots	Click Delete. Result: The restore snapshots identified by your selections are deleted. When the deletion is complete, a status popup is displayed. You have completed this procedure.
5	If, after previewing the deletion, you want to delete the restore snapshots listed in the preview, click Delete on the Delete Backup Data Set Preview window. Result: The restore snapshots listed in the preview window are deleted.	

Delete backup advanced option

When you use the Action menu to delete a backup, you specify which storage groups (Stores) the backups to be deleted must contain. However, you might want to delete a backup that contained only some of the selected storage groups. You can use the Delete Backup Sets That Contain One or More of the Selected Storage Groups check box in the Advanced option of the Delete Backup window to accomplish this. If this check box is selected, any backup containing any of the selected storage groups is deleted.

Note

This option is useful only if you created backups that did not contain all storage groups in a storage group set. For easiest backup administration, NetApp recommends that you always back up an entire storage group set.

Deleting backups

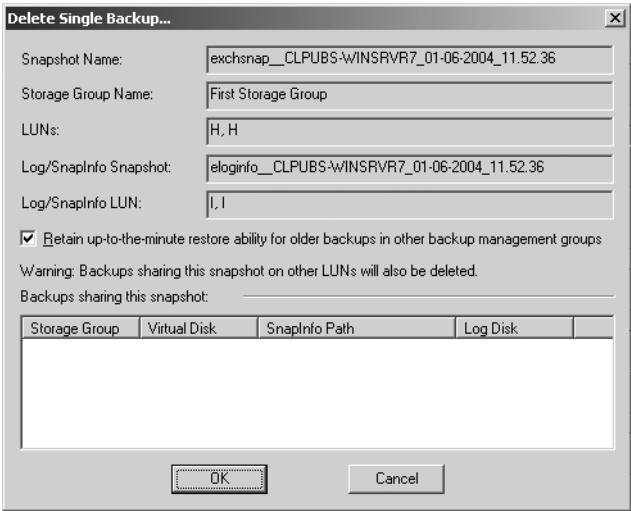
Deleting selected backups

Deleting individual backups

If you must delete an individual backup, you can do so using the procedure explained in this section.

To delete an individual backup, complete the following steps.

Note—
The window shown in this procedure is for the Exchange 2000 or 2003 version of SnapManager. If you are using Exchange 5.5, some of the text you see is slightly different. However, the actions you take to perform these steps are the same.

Step	Action
1	Select the SnapManager Restore tab in the SnapManager interface.
2	Select the storage group (Store) in which the backup resides.
3	Right-click the backup you want to delete and select Delete to display the Delete Single Backup window. 

Step	Action
4	Review the list of backups sharing this snapshot; all of these backups will be deleted at the same time.
5	Using the Retain Up-to-the-Minute Restore Ability... check box, select whether you want to retain the ability to use any older backups that might remain after the deletion to perform up-to-the-minute restores. For more information about this option, see “Option to retain up-to-the-minute restore ability” on page 115.
6	Click OK. Result: The backup is deleted.

About this chapter This chapter describes how to recover data from a SnapManager backup set with SnapManager Restore.

Topics in this chapter This chapter discusses the following topics:

- ◆ “[Understanding SnapManager Restore](#)” on page 130
- ◆ “[Guidelines for restoring SnapManager backups](#)” on page 135
- ◆ “[Restoring from a SnapManager backup](#)” on page 137

Understanding SnapManager Restore

What SnapManager Restore does

SnapManager Restore enables you to restore your Exchange databases from a backup that you created previously with SnapManager Backup, or from an archive, then optionally recover the databases up to their current state by replaying the associated transaction logs. This would become necessary if your Exchange data became corrupted or unavailable.

SnapManager 3.1 for Microsoft Exchange supports restoring an entire storage group or an individual database.

How it works

SnapManager Restore uses the following process when restoring from a backup.

Caution_____

If you are restoring in a Windows cluster, do not attempt to manage any cluster resources while the restore is running.

Stage	Process
1	Checks that the selected backup was verified, or that the Database Verification Override was selected. Caution_____ NetApp strongly recommends that you restore only from verified backups. For details, see “Importance of verifying databases to be restored” on page 132.
2	Creates a snapshot of the volume containing the storage group or database to be restored, so that the pre-restore state is preserved.
3	Restores the Exchange data from the snapshot of the LUN.
4	Restores the required transaction log for replay.

Stage	Process
5	Uses the Exchange recovery process to play forward transaction logs into the restored databases. Note_____ On Windows 2000 Server, the hard recovery process is used. On Windows Server 2003, the soft recovery process is used. _____

SnapManager Restore types

You can use SnapManager Restore to do either of the following types of restore:

- ◆ An up-to-the-minute restore
- ◆ A point-in-time restore

Up-to-the-minute restore: In an up-to-the-minute restore, all the transaction logs that were not committed to the databases, from the time the backup set was created up to the most current time, are played forward and applied to the databases. This includes transaction logs from the backup sets, as well as the existing transaction logs in the transaction log directory. A contiguous set of transaction logs is required for an up-to-the-minute restore to succeed.

This option is selected by default.

Example: Suppose you run SnapManager Backup every day at noon, and on Wednesday at 4 p.m. you decide to restore from a previous backup. For some reason, the backup set from Wednesday lunchtime failed verification, so you decide to restore from the Tuesday lunchtime backup. After that backup is restored, all the transaction logs are played forward and applied to the restored databases, starting with those that were not committed when you created Tuesday's backup set and continuing through the latest transaction log written on Wednesday at 4 p.m.

Point-in-time restore: In this case, only the transaction logs that existed in the active file system at the time the backup was taken (and were not committed to the databases) are replayed. All the transaction logs beyond the point-in-time that exist in the transaction log directory belonging to the restored storage group are removed.

You can use this method to restore a database or storage group back to a time before a corruption occurred.

For more information about choosing the restore type, see [“Guidelines for choosing the type of restore to perform”](#) on page 135.

Importance of verifying databases to be restored

Using SnapManager 3.1 for Microsoft Exchange, you can override the verification requirement when restoring from a SnapManager backup. However, NetApp strongly recommends that you restore only from verified backups. The verification process protects you from restoring a backup with any physical-level corruption. Physical-level database corruption can occur silently in Exchange databases. The only way to know whether a particular database backup incurred physical-level corruption is to run database verification on that backup.

Exchange Recovery Storage Group incompatibility with SnapManager Restore

For Exchange 2003 running on Windows 2000, when the Exchange Recovery Storage Group is present, Exchange automatically performs any restore to that storage group. Therefore, SnapManager Restore cannot function correctly if a Recovery Storage Group is present in this configuration.

If you are running Exchange 2003 on Windows 2000, and you configured a Recovery Storage Group, you need to delete it or override the Recovery Storage Group restore redirection before a SnapManager Restore can be completed successfully. For more information about overriding the Recovery Storage Group restore redirection, see Microsoft KB article 824126.

About Restore snapshots

Every time you perform a restore, a snapshot is created on the volume containing the transaction logs. The name of this snapshot contains the prefix “rstrsnap”.

After you verify that a restore was completed successfully and you are satisfied with the results, you can delete the restore snapshot using the Action menu. For details, see [“Deleting backups using the Action menu”](#) on page 120.

Transaction log sequence verification options

When you perform a restore, you can optionally choose to decrease the time the restore takes by skipping the pre-restore transaction log sequence and database metadata checks. If you skip these checks, and a problem exists with your transaction log sequencing or your database metadata, your restore will fail.

You can choose from the following metadata checks:

- ◆ An exhaustive check of the metadata
For this option, select both the Verify Transaction Log Sequence... and the Exhaustive Verification check boxes.
For more information about this option, see [“What the exhaustive transaction log sequence verification does”](#) on page 133.
- ◆ A quicker, less comprehensive check of the transaction logs

For this option, select the Verify Transaction Log Sequence... check box and clear the Exhaustive Verification check box.

For more information about this option, see [“What the non-exhaustive transaction log sequence verification does”](#) on page 133.

◆ No metadata verification

For this option, clear both the Verify Transaction Log Sequence... and the Exhaustive Verification check boxes.

Note

For backward compatibility with previous SnapManager versions, select the exhaustive check, which is selected by default.

What the exhaustive transaction log sequence verification does

The exhaustive option of the transaction log sequence verification performs the following checks:

- ◆ The transaction log headers are analyzed, and the following conditions are verified:
 - ❖ The transaction logs are all present and sequenced correctly.
 - ❖ The signatures of all the transaction logs match.
 - ❖ Each transaction logs' create time matches the next log's previous time.
- ◆ A snapshot of the databases in this backup is mounted, the database's headers are analyzed, and the following conditions are verified:
 - ❖ The database signature matches the log database signature.
 - ❖ The database header in the snapshot matches the database metadata in the SnapInfo directory (Windows 2000 only).

What the non-exhaustive transaction log sequence verification does

The non-exhaustive option of the transaction log sequence (selected if you clear the Exhaustive Verification check box) uses the transaction log file names to verify that the transaction log sequence is correct and that all log files are present.

About temporary log files

When running on Windows 2000 Server, SnapManager Restore creates temporary files. Usually, these files are deleted after the restore is done, but you can retain them for debugging by selecting the Keep Log and Patch Files in Temp Directory After Restore check box in the Restore tab or Wizard.

If the directory or subdirectory you specify to contain these files does not exist, SnapManager creates it automatically. SnapManager does not access this directory directly. Rather, it is accessed through the administrative share for the drive letter specified, for example, C\$. If the administrative share does not exist, SnapManager prompts you for whether you want SnapManager to create the share automatically.

Note

The temporary files cannot be placed in the root directory. For example, C:\Temp is a valid location for the temporary files; putting them in C:\ causes the restore to fail.

About restoring in a Windows cluster

SnapManager takes the storage group that is to be restored offline before performing the restore, if that storage group is still online.

In a Windows cluster, all resources that are directly or indirectly dependent on the LUN that is to be restored are taken offline, as well as the LUN itself. This means that the entire Exchange virtual server (all storage groups) is offline.

If a cluster move group operation occurs during the restore (for example, if the node that owns the resources goes down) you must restart the SnapManager user interface and the restore.

About performing an up-to-the-minute restore after a point-in-time restore from the most recent backup

If you perform a point-in-time backup from the most recent backup and then decide to perform an up-to-the-minute backup from the same backup, SnapManager will successfully complete each operation. However, the results might not be what you intended, because any transactions that occurred after the backup was taken and before the point-in-time restore will not be restored. The reason is that when you perform the point-in-time restore, the transaction logs containing transactions recorded after the selected backup are removed.

For this reason, use caution when selecting a point-in-time restore.

Guidelines for restoring SnapManager backups

Guidelines for choosing the type of restore to perform

Follow these general guidelines to help you decide whether to use a point-in-time or up-to-the-minute restore:

- ◆ If you want to roll forward all the transactions up to the most current time, use an up-to-the-minute restore.
- ◆ If you want to recover the databases as they were at a particular point in time, for example, at the point when the most recent backup was created, use a point-in-time restore.
- ◆ For to an up-to-the-minute restore to succeed, a contiguous set of all required transaction logs must be in the SnapInfo folder and the storage group transaction log directory.
- ◆ After a point-in-time restore of a backup that is not the most recent one, all existing backups become point-in-time restorable only. Backups created after the restore will be available for up-to-the-minute restores.
- ◆ After a point-in-time restore of the most recent backup, you can still perform an up-to-the-minute restore from any backup, including the most recent backup. However, you will lose all transactions that occurred between when you created the last backup and when you performed the point-in-time restore.

For more information about why this occurs, see [“About performing an up-to-the-minute restore after a point-in-time restore from the most recent backup”](#) on page 134.

- ◆ If you are restoring individual databases, you can perform only an up-to-the-minute restore.

Guidelines when restoring a backup

Follow these guidelines when restoring from a SnapManager backup:

- ◆ If possible, you should always use the most recent backup for an up-to-the-minute restore. Otherwise, more transaction logs need to be replayed, causing the restore to take more time.

The most recent backup's name contains `recent` if you did not use the unique name option, or the most recent time stamp if you did.

- ◆ You can restore an entire storage group, or, if you configured your data store appropriately, individual databases. If you need to restore more than one storage group, you must run SnapManager Restore more than once.

- ◆ If you renamed a storage group since the backup was made, you cannot recover it from a backup taken before the storage group was renamed.
 - ❖ If you rename a storage group, make sure that you back it up as soon as possible.
 - ❖ If you must recover a storage group from a backup taken before the storage group was renamed, rename the storage group back to its old name, then recover it from the backup.

Restoring from a SnapManager backup

Ways to access SnapManager Restore

You can access SnapManager Restore to restore databases or storage groups from a SnapManager backup in two ways:

- ◆ From the SnapManager Restore Wizard
For details, see “[Information you need to perform a restore](#)” on page 137.
- ◆ From the SnapManager Restore tab
For details, see “[Restoring using the Restore tab](#)” on page 139.

Information you need to perform a restore

You need to provide the following information to perform a SnapManager restore:

- ◆ The storage group that you want to restore, or that contains the databases you want to restore

Note

All databases residing on the same LUN must be restored together.

- ◆ Whether you want to perform an up-to-the-minute restore (the default) or a point-in-time restore
For more information about the restore types, see “[SnapManager Restore types](#)” on page 131. For more information about choosing a restore type, see “[Guidelines for choosing the type of restore to perform](#)” on page 135.
- ◆ Whether you want to perform a restore or only a test restore
- ◆ Whether you want to verify the transaction log sequence and database metadata before the restore
For more information on this option, see “[Transaction log sequence verification options](#)” on page 132.
- ◆ If it is not a test, and you are running on Windows 2000 Server, where you want the temporary log and patch files to be placed
For more information about where to put the temporary files, see “[About temporary log files](#)” on page 133.
- ◆ If it is not a test, whether you want your Exchange databases to be remounted after the restore is complete
- ◆ If it is a test up-to-the-minute restore, whether you want to check the current transaction logs
This option confirms that all the required transaction logs are present.

- ◆ If the backup has not been verified previously, whether you want to verify the backup before restoring it

Restoring databases using the Restore Wizard

To restore an Exchange storage group from a backup set using the SnapManager Restore Wizard, complete the following steps.

Note

Only one storage group or any of the databases in that storage group can be restored at a time.

Step	Action
1	Make sure that all Explorer windows are closed on the Exchange server running SnapManager.
2	Disable any SnapManager operations that are scheduled to run against the Exchange data you are restoring, including any jobs scheduled on remote management or remote verification servers.
3	From the SnapManager main menu, select Wizard > SnapManager Restore to open the SnapManager Restore Wizard.
4	Follow the instructions in the wizard. For a list of information you need to provide as you complete this step, see “ Information you need to perform a restore ” on page 137.
5	After you finish the Restore Wizard, the Restore Status window appears. Click Start Now to start the restore. Result: Your database or storage groups are restored from the backup you selected. Use the Switch button to switch between the task list and the progress report.
6	After the restore is complete, click OK. Result: Your restore is now complete and your Exchange server comes back online.

Step	Action
7	You can optionally perform a SnapManager backup and verification to verify that your restored database is free of physical-level corruption.

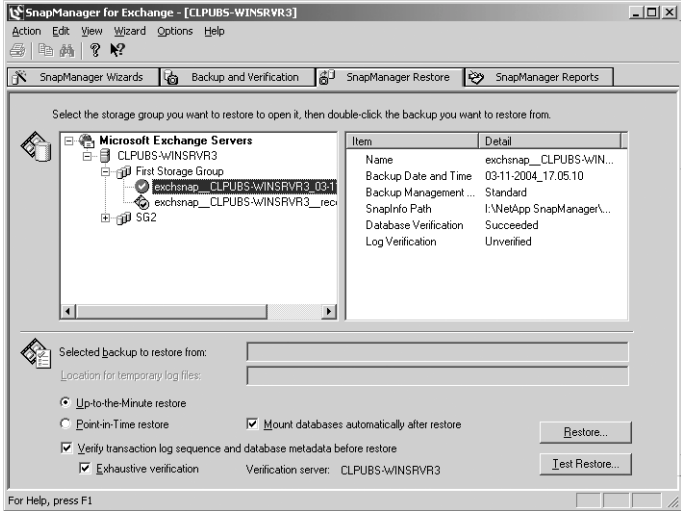
Restoring using the Restore tab

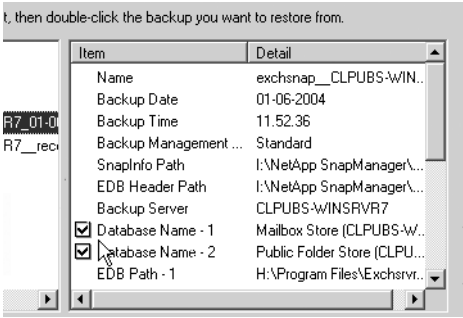
To restore all the Exchange databases from a backup using the SnapManager Restore tab, complete the following steps.

Note

The windows shown in this procedure are for the Exchange 2000 or 2003 version of SnapManager. If you are using Exchange 5.5, some of the text you see is slightly different. However, the actions you take to perform these steps are the same.

Step	Action
1	Make sure that all Windows Explorer windows are closed on the Exchange server running SnapManager.
2	Disable any SnapManager operations that are scheduled to run against the Exchange data you are restoring, including any jobs scheduled on remote management or remote verification servers.

Step	Action
3	Select the SnapManager Restore tab to display the backup sets you can select to be restored. 
4	Select the storage group (Store) that you want to restore.
5	Double-click the backup under the storage group that you want to restore.

Step	Action	
6	If you do not want to restore all the databases in this storage group, clear the check box in the details window for the databases you do not want to restore. Note_____ If you are running Exchange 2003, all databases in the storage group are dismounted during the restore, even if they are not all being restored. _____ 	
7	If you are running on Windows Server 2000, enter a temporary location for your log and patch files in the Temporary Location for Log and Patch Files field. For more information about where to put the temporary files, see “About temporary log files” on page 133.	
8	If...	Then...
	You want an up-to-the-minute restore	Select the Up-to-the-Minute Restore radio button.
	You want a point-in-time restore	Select the Point-in-Time Restore radio button.

Step	Action	
9	If you do not want to perform exhaustive verification of the transaction log sequence and database metadata before the restore, clear the Verify Transaction Log Sequence and Database Metadata Before Restore and Exhaustive Verification check boxes. For more information about these options, see “Transaction log sequence verification options” on page 132.	
10	If you want SnapManager to automatically remount your restored databases immediately after the restore, make sure that the Mount Database Automatically After Restore check box is selected.	
11	If you are running on Windows 2000 Server and you want to use the temporary files SnapManager creates for the restore for troubleshooting, select the Keep Files in Temporary Directory After Restore check box. Otherwise, the temporary files are deleted after the restore.	
12	If...	Then...
	This is a test restore	Click the Test Restore button and continue to Step 13. Result: The Select Test Restore Options window is displayed.
	This is not a test restore	Click the Restore button and skip to Step 14. Result: In the Restore Status window, a scrollable data window is displayed, showing the tasks that are performed for this restore.
13	In the Select Test Restore Options window, select whether you want to check the current logs (for up-to-the-minute restores only) and run database verification, and then click OK. Result: In the Restore Status window, a scrollable data window appears displaying the tasks that are performed for this restore.	

Step	Action
14	To start the restore, click Start Now. Result: Your database or storage groups are restored from the backup you selected. Use the Switch button to switch between the task list and the progress report.
15	After an actual restore, you can optionally perform a SnapManager backup and verification to verify that your restored database is free of physical-level corruption.

About this chapter

This chapter discusses how SnapManager uses SnapMirror to enable you to replicate backups of databases created during backup to mirrored volumes.

Other documentation

For more information about configuring and using SnapMirror, see the following guides:

- ◆ For an overview of SnapMirror—including a detailed explanation of what mirror volumes are, how they work, when to use or access data stored on a SnapMirror destination volume, and direction about how to set up and configure SnapMirror on a filer—see *Data Protection: Online Backup and Recovery Guide* for your version of Data ONTAP.
- ◆ For details about how SnapMirror is used with SnapDrive to create a destination volume for replicating LUNs and for a description of SnapMirror replication—including reasons for using it and the benefits it offers—see your SnapDrive documentation.
- ◆ For details about how to connect to a LUN in a SnapMirror destination volume, see your SnapDrive documentation.
- ◆ For details about how to access mirrored data to recover from data, see [“Restoring your Exchange environment”](#) on page 180.

Topics in this chapter

This chapter discusses the following topics:

- ◆ [“Understanding SnapMirror”](#) on page 146
- ◆ [“How SnapManager uses SnapMirror”](#) on page 147
- ◆ [“Scheduling SnapMirror replication for SnapManager backups”](#) on page 149

Understanding SnapMirror

How SnapMirror works

SnapMirror creates replicas of volumes hosting LUNs. SnapMirror mirrors a snapshot of data on a source volume to one or more volumes configured as destinations of the source volume. SnapMirror can replicate a source volume to a destination volume on the same filer or to a different filer. When you use SnapMirror to replicate volumes from one filer to another, the destination filer can be in a different geographical location. This ability to duplicate data in different locations is a key component of a sound disaster recovery plan.

Data stored in a mirror on a destination volume can be accessed through SnapDrive. Because the mirror is volume wide, snapshots of other data sets on the source volume are mirrored also.

SnapMirror updates the destination volumes to reflect incremental changes on the source volume. The result of this process is an online, read-only destination volume that contains the same data as the source at the time of the most recent update.

Caution

Because SnapManager uses SnapMirror in asynchronous mode, any disk writes that occurred on the source volume after the most recent SnapMirror replication update are not available if a catastrophic failure occurs before the next update. This is because they were not replicated to the SnapMirror destination volume.

Requirements for using SnapMirror with SnapManager

To use SnapMirror with SnapManager, you must have previously configured SnapMirror on both the source volume to be replicated and its destination volumes. How to complete these tasks is explained in your SnapDrive documentation. Your configuration must satisfy the following requirements:

- ◆ There must be one or more SnapMirror source volumes hosting LUNs.
- ◆ There must be one or more SnapMirror destination volumes for each source volume.
- ◆ SnapDrive licenses must be enabled on both the source and destination filers.
- ◆ You must manually configure SnapMirror replication between source and destination volumes.
- ◆ You must disable the SnapMirror replication schedule on your filer.
- ◆ You must configure the SnapMirror replication as asynchronous.

How SnapManager uses SnapMirror

When SnapMirror updates occur	If Exchange data backed up by SnapManager resides in a volume that is configured as a SnapMirror source volume with one or more appropriately configured destination volumes, a SnapManager backup of an Exchange database stored on that volume causes SnapDrive to request a SnapMirror update for that volume. The schedule you define for backups sets the schedule for mirror replication.
SnapMirror replication type	When you use SnapMirror to replicate SnapManager backups, SnapMirror replication is asynchronous. This means that changes made between SnapManager backups are not reflected in the SnapMirror target volume, and any restore from the target volume would restore the databases to their state at the time of the last SnapManager backup. However, you can use SnapDrive to minimize the time between SnapMirror replications. For more information about scheduling your SnapMirror replications, see “Scheduling SnapMirror replication for SnapManager backups” on page 149.
SnapMirror replication unit	When you use SnapMirror to replicate SnapManager backups, you can replicate only volumes, not qtrees. SnapMirror qtree replication is not supported by SnapManager.
How SnapMirror replication works	In previous releases of SnapManager for Microsoft Exchange, the SnapMirror mirror update was always initiated for each snapshot as it was taken. This approach resulted in redundant mirror updates. With SnapManager 3.0 for Microsoft Exchange and later, the mirror update request is delayed until SnapManager explicitly requests it, after the SnapManager backup is complete. Note If you do not want the SnapMirror destination volume to be updated after a backup is taken, you can override the update using the Backup Wizard or the Backup tab. The following table provides an overview of how SnapMirror destination replication works.

Stage	Process
1	A SnapManager backup is initiated.
2	SnapManager completes all snapshots required for the backup, then requests a SnapMirror volume update through SnapDrive.
3	If any volume whose data is captured in the backup is a SnapMirror source volume, SnapDrive requests information about all SnapMirror destination volumes for the source volume.
4	SnapDrive sends a SnapMirror destination update request to all the related destination volumes.
5	SnapMirror updates the destination volumes to reflect incremental changes on the source volume.

Scheduling SnapMirror replication for SnapManager backups

Replication scheduling considerations

When you configure the filer volume containing your Exchange data as a SnapMirror source volume, every time a SnapManager backup is taken, the SnapMirror destination volume is optionally updated.

Taken alone, this schedule might not provide an optimal SnapMirror replication schedule. This is because any changes that occur between replications are not replicated to the destination volume until the next replication update. Any restore from the destination volume would restore the Exchange data to its state at the last backup time; subsequent changes to the Exchange data store would not be restored.

Rather than increasing the frequency of SnapManager backups, you can use the rolling snapshot capability of SnapDrive to provide frequent replication of the LUNs that contain the Exchange transaction logs. With more current transaction logs, a restore from the destination volume replays the transaction logs, resulting in an up-to-the-minute restore for the time of the last transaction log update. This method enables you to keep your destination volume more current without running the risk of overlapping your SnapManager operations.

Advantages of SnapDrive rolling snapshots

When you use the SnapDrive update mirror, special snapshots called rolling snapshots are used. These snapshots are created only for SnapMirror replication. For more information about rolling snapshots, see your SnapDrive documentation.

There are three major advantages to using SnapDrive rolling snapshots to augment your SnapMirror replication schedule for SnapManager:

- ◆ Fewer changes are made to the Exchange data between replications.
When you use SnapDrive to initiate frequent updates to the transaction logs, a restore from the destination volume replays the transaction logs, resulting in an up-to-the-minute restore for the time of the last transaction log update.
- ◆ Fewer SnapManager backups are required.
It is not recommended to take SnapManager backups every few minutes. This can result in overlapping SnapManager operations and more difficulty managing the large number of resulting backups.
- ◆ Fewer snapshots are retained.
A maximum of two rolling snapshots are retained at any time.

Scheduling replication for SnapManager using both SnapManager and SnapDrive

To create a SnapMirror replication schedule for your SnapManager backups using both SnapManager and the SnapDrive command-line interface tool (`sdcli`), complete the following steps.

Step	Action
1	Configure a mirror on the filer for the volume occupied by the LUNs backed up by SnapManager. Create an empty replication schedule (“- - -”) where you would normally enter the schedule parameters. For more information about setting a SnapMirror replication schedule, see your SnapDrive documentation and the <i>Data ONTAP Data Protection: Online Backup and Recovery Guide</i>.
2	Schedule your SnapManager backups according to your local requirements using either the SnapManager Backup Wizard or the Backup tab. For more information about SnapManager backup schedules, see “Recommendations for scheduling backups and verifications” on page 91. For more information about setting up scheduled SnapManager backups, see “Performing a backup” on page 97.
3	Add the <code>sdcli</code> command to the Windows Task Scheduler using the appropriate command-line switches. Take the following requirements into account: ◆ You must know the letter of the drive where the transaction logs reside. ◆ The task must run under the same account as the SnapDrive service. Example: The following command can be scheduled successfully on the local host, assuming that Z: is the drive where the transaction logs reside: <pre>sdcli snap update_mirror -d Z</pre> For more information about <code>sdcli</code>, see your SnapDrive documentation.

Example schedule

The following table shows an example of a schedule documenting the additional intervals when the volume containing the transaction logs is replicated. The schedule shown in this table allows for a thirty-minute elapse time between the SnapManager backup and the transaction logs drive replication.

You might need to adjust the timings in this example for your environment to account for these requirements:

- ◆ The first supplemental replication after the backup must not begin before the backup is complete, including verification, and the ensuing SnapMirror volume update is also complete.
- ◆ The subsequent supplemental replications must not begin before the previous supplemental replication is complete.

Regularly scheduled SnapManager backup	Supplemental SnapMirror replication of transaction logs
7:00 a.m.	7:30 a.m. 8:30 a.m. 9:30 a.m. 10:30 a.m. 11:30 a.m. 12:30 p.m.
1:00 p.m.	1:30 p.m. 2:30 p.m. 3:30 p.m. 4:30 p.m. 5:30 p.m. 6:30 p.m. 7:30 p.m. 8:30 p.m. 9:30 p.m.
10:00 p.m.	10:30 p.m.

About this chapter

This chapter provides guidelines and direction explaining how to create archives of snapshots containing Exchange databases backed up using SnapManager.

Topic in this chapter

This chapter discusses the following topics:

- ◆ “[About archiving](#)” on page 154
- ◆ “[Archiving your SnapManager backups](#)” on page 157
- ◆ “[Using Run Command After Operation to archive automatically](#)” on page 167

About archiving

Why organizations archive data

Organizations archive data for many reasons, central of which is disaster recovery. Archiving data enables an organization to create a complete, self-consistent replica of a collection of data suitable for bringing back online at some future date. Where backup is concerned with users accidentally destroying files or individual hardware components failing, disaster recovery addresses recovery from events that might disable an entire building or geographical area.

Organizations archive data for purposes other than disaster recovery. Space constraints often require that older data be archived. Reasons organizations archive and restore data are as diverse as their businesses. Some organizations restore data for use in historical analysis, some restore data for use in litigation.

Importance of archiving a complete backup set

Archived data might be used to re-create an Exchange data store from the ground up. For this reason, it's important to understand all the components of a SnapManager backup set, and what those components are named, so that you know that your archives contain all the data required to restore your Exchange data.

SnapManager backup sets

A SnapManager backup set includes the following components:

- ◆ Exchange database snapshots
- ◆ Exchange transaction log snapshots
- ◆ SnapInfo directory snapshot

SnapManager snapshot naming conventions

The naming conventions for SnapManager snapshots depend on whether your SnapManager host system is running Windows 2000 Server or Windows Server 2003.

Snapshot naming conventions for Windows 2000 Server: If your SnapManager host system is running Windows 2000 Server, your snapshot names will be as follows:

- ◆ Exchange database snapshots
 - ❖ For the standard backup management group:
`exchsnap__exchangeservername_date_time`

- ❖ For all other backup management groups:
`exchsnap__exchangeservername_date_time__backupmgmtgroup`
- ◆ SnapInfo directory and transaction log snapshots
 - ❖ For the standard backup management group:
`eloginfo__exchangeservername_date_time`
 - ❖ For all other backup management groups:
`eloginfo__exchangeservername_date_time__backupmgmtgroup`

Note

If you did not select the Use Unique Name option when you created the SnapManager backup, the most recent snapshot name contains **recent** instead of `date_time`. This is for backward compatibility with previous versions of SnapManager, which did not include the Run Command After Operation feature.

Snapshot naming conventions for Windows Server 2003: If your SnapManager host system is running Windows Server 2003, your snapshot names will be as follows:

- ◆ Exchange database and transaction log snapshots
 - ❖ For the standard backup management group:
`exchsnap__exchangeservername_date_time`
 - ❖ For all other backup management groups:
`exchsnap__exchangeservername_date_time__backupmgmtgroup`
- ◆ SnapInfo directory snapshot
 - ❖ For the standard backup management group:
`eloginfo__exchangeservername_date_time`
 - ❖ For all other backup management groups:
`eloginfo__exchangeservername_date_time__backupmgmtgroup`

Note

If you did not select the Use Unique Name option when you created the SnapManager backup, the most recent snapshot name contains **recent** instead of `date_time`. This is for backward compatibility with previous versions of SnapManager, which did not include the Run Command After Operation feature.

Guidelines for archiving

Follow these guidelines when you create archives:

- ◆ Only archive verified backups.
If you are not sure whether a backup is verified, you can use the SnapManager Restore tab to check; a backup with a green check mark is verified.
- ◆ Create an archive of the most recent backup.
 - ❖ If you didn't use the unique name option when the backup was created, the most recent snapshot in the filer's LUN drive volume that stores the Exchange databases is always named `/exchsnap_servername_recent` or `/exchsnap_servername_recent_backupmgmtgroup`. *Servername* is the name of the Exchange server from which the snapshot was taken, and *backupmgmtgroup* is the name of the backup management group.
 - ❖ If you used the unique name option, look for the snapshot with the most recent date and time.
- ◆ LUNs cannot be archived using the CIFS or NFS protocols. Use the filer's `dump` command or an NDMP backup application to archive LUNs.

Considerations for scheduling SnapManager Backup for archiving

Scheduling SnapManager backups for archiving must take into consideration many factors, including the following:

- ◆ Archive method used
- ◆ Service Level Agreements for disaster recovery
- ◆ Number of SnapManager backups performed per day
- ◆ Exchange client activity schedules
- ◆ Backup verification time

Archiving individual storage groups or databases

Archiving individual storage groups or databases from SnapManager backups is not recommended. This task requires a full understanding of the snapshot naming conventions used by SnapManager for Microsoft Exchange and should not be attempted without knowing which snapshots contain the appropriate storage groups and transaction logs for a given point in time. Archiving complete Exchange server backups (all storage groups) is recommended.

Archiving your SnapManager backups

Methods for archiving your SnapManager backups

There are different methods for collecting the necessary parts of the SnapManager backup set for archiving. They each have their own advantages and disadvantages. Read the section for each method to decide which one works best for your organization. The three methods are as follows:

- ◆ Use NDMP or the filer's `dump` command to archive the LUNs containing the Exchange data and the SnapInfo directory directly from the filer to the archive medium.

For more information about this method, see “[Using NDMP or dump to archive SnapManager backups](#)” on page 158.

- ◆ Mount the LUNs in a SnapManager backup snapshot and share it, then use NTBackup or another Windows backup utility to copy the LUNs' contents to the archive medium.

For more information about this method, see “[Using a Windows backup utility to archive SnapManager backups](#)” on page 162.

- ◆ Create an Exchange copy-type backup directly to the archive medium using an Exchange-aware backup application.

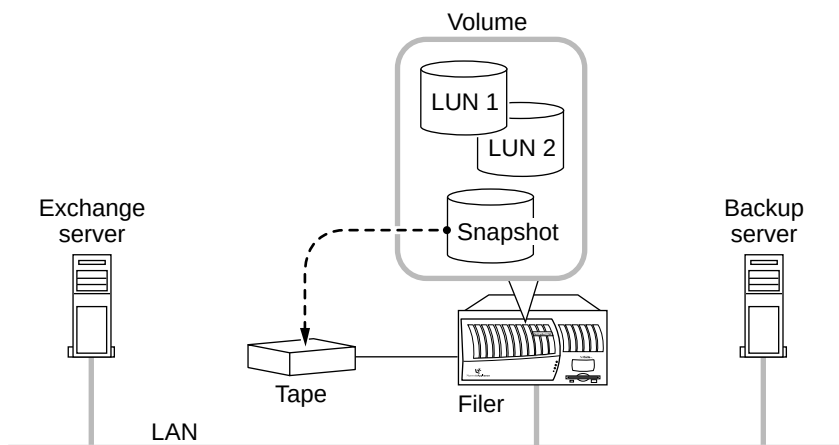
For more information about this method, see “[Archiving Exchange backups](#)” on page 165.

Using NDMP or dump to archive SnapManager backups

About this method

When you use NDMP or `dump` to archive your SnapManager backups, you use NDMP or the filer's `dump` command to archive each LUN that contains data for that backup set. Using NDMP or the `dump` command enables you to archive your SnapManager backup sets without involving Exchange or the Exchange server at all. Snapshots are taken of the LUNs, then copied to the archive medium and deleted.

This archive method is represented by the following diagram:



Archiving using NDMP or dump

For more information about backing up filer data to tape, see the *System Administration Data Protection Guide* for your version of Data ONTAP.

Advantages and disadvantages of this method

Using NDMP or `dump` to archive SnapManager backups provides the following advantages and disadvantages:

Advantages:

- ◆ Because this method does not rely on mounting a snapshot, it does not risk the creation of busy snapshots.

- ◆ Because this method archives the entire raw LUN, restoring is simply a matter of replacing the LUNs.
- ◆ If your archive procedure does not send the data over the network, this method can be significantly faster than other methods.

Disadvantages:

- ◆ Because you are archiving raw LUNs, the entire LUN containing the Exchange data is archived, so you archive more data than you need.

Note

If archiving extra data is undesirable, you can use NTBackup or another Windows backup utility to back up the corresponding SnapInfo directory. This must be coordinated so that the two pieces of the archive are kept together for later retrieval.

- ◆ If you archive the SnapInfo directory separately, you must ensure that you get both required components from different locations into the same archive.

Path name to use when archiving using NDMP or dump

You use the following absolute path name when using the NDMP or dump archive method:

/vol/volume_name/.snapshot/snapshot_name/LUN_name

- ❖ *volume_name* is the name of the volume containing the data to be archived.
- ❖ *snapshot_name* is the name of the snapshot containing the LUNs you want to archive.

For more information about SnapManager snapshot naming conventions, see “[SnapManager snapshot naming conventions](#)” on page 154.

- ❖ *LUN_name* is the name of the LUN containing the data to be archived.

Usage example

The following script uses the filer’s `dump` command to dump the database, transaction logs, and SnapInfo LUNs to tape. This script relies on `rsh` functioning on the Exchange server using the SnapManager user account.

This script uses the following assumptions, which you might need to alter for your environment:

- ◆ The script is run on the computer running Exchange and SnapManager.
- ◆ The name of the filer is `Filer1`.

- ◆ The name of the LUN containing the Exchange databases is `exch1db.lun`.
- ◆ The name of the LUN containing the Exchange transaction logs and the SnapInfo directory is `exch1logs.lun`.
- ◆ The name of the volume containing the Exchange databases is `ExchVol`.

Script:

REM Back up the LUN containing the Exchange
REM database. For this example, a level 0 backup is
REM performed to the tape device named `nrst0a`.

```
rsh Filer1 dump 0f nrst0a /vol/ExchVol/.snapshot/%1/exch1db.lun
```

REM Before appending the next backup to the tape,
REM reposition to the end of the tape so the next
REM write will not overwrite the existing data.

```
rsh Filer1 mt -f nrst0a eom
```

REM Back up the LUN containing the Exchange
REM transaction log files and the SnapManager SnapInfo
REM directory.

```
rsh Filer1 dump 0f nrst0a /vol/ExchVol/.snapshot/%2/exch1logs.lun
```

Command line parameters:

This script can be invoked using the SnapManager Run Command After Operation feature with the following command:

```
C:\SnapManager Scripts\scriptname.txt $ExchSnapshot  
$InfoSnapshot
```

These command-line parameters provide values to the script similar to these examples:

- ◆ `%1: exchsnap__SRVR3_01-20-2004_12.05.58__Daily`
- ◆ `%2: eloginfo__SRVR3_01-20-2004_12.05.58__Daily`

For more information about the Run Command After Operation feature, see [“Using Run Command After Operation to archive automatically”](#) on page 167.

Script invocation without using command-line parameters:

If you prefer not to use the Run Command After Operation feature and you are not using the unique name option for your backups, you can hardcode the snapshot names into the script. For example, the **dump** command for the database might look like this, for an Exchange server named SRVR3:

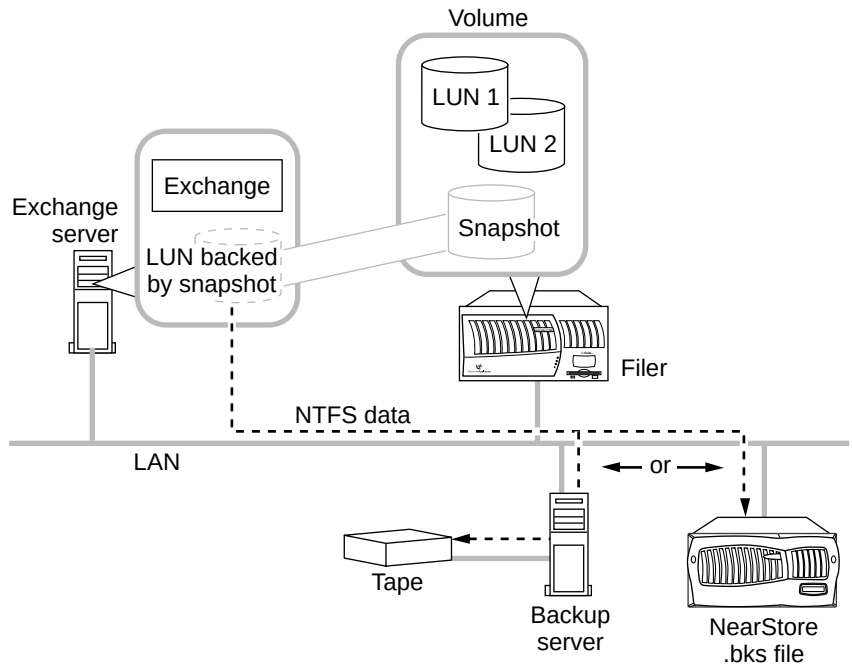
```
rsh Filer1 dump 0f nrst0a  
/vol/Exch/.snapshot/exchsnap__SRVR3__recent__Daily/exch1logs.lun
```

Using a Windows backup utility to archive SnapManager backups

About this method

When you use a Windows backup utility to archive your SnapManager backups, you mount the LUNs backed by the backup snapshot you want to archive, and then use NTBackup or another Exchange-aware Windows backup utility to copy the archive data to your archive medium. In this case, the NTFS data is backed up, rather than the raw LUNs.

This archive method is represented by the following diagram:



Archiving using Windows backup utility

Note

The LUN does not need to be mounted on the Exchange server; another computer can be used for this function.

Components that must be included in the archive

The archive must include the following two components:

- ◆ The SnapInfo directory as it was backed up directly from the Exchange server
- ◆ The Exchange data as extracted from the LUN backed by snapshot

Advantages and disadvantages of this method

Using a Windows backup utility to archive SnapManager backups provides the following advantages and disadvantages:

Advantages:

- ◆ Because you are archiving NTFS data, not raw LUNs, you can archive exactly the data that you need, and no more.
- ◆ The procedures and tools used for this method are probably familiar and available to you.

Disadvantages:

- ◆ Because this method relies on mounting a snapshot, you must be careful to avoid scheduling any backups while the archiving is performed. This is because creating a snapshot of a mounted snapshot results in a snapshot that cannot be deleted. For more information about busy snapshots, see “[Problem deleting backups due to busy snapshot error](#)” on page 116.
- ◆ You must make sure that you get both required components from different locations into the same archive.

Usage example

The following script mounts a snapshot of the LUNs that contain the Exchange databases and backs them up using NTBackup. It then dismounts the LUNs and backs up the SnapInfo directory. The /N and /D options are used to demonstrate the options to name the tape and add a description.

This script uses the following assumptions, which you might need to alter for your environment:

- ◆ The script is run on the computer running Exchange and SnapManager.
- ◆ The drive letter for the Exchange database is S:.
- ◆ The snapshot is mounted as drive V:.

The drive letter used for the LUN mount must be available when the script is run.

Script:

REM Mount a LUN backed by the snapshot of the Exchange database
REM as drive letter V:\.

```
sdcli snap mount -k s -s %1 -d v
```

REM Use NTBackup to back up the database files. The
REM path to the databases in your environment might be
REM different.

```
ntbackup backup "V:\Program Files\Exchsrvr\mdbdata" /N %1 /D %2
```

REM Dismount the snapshot mounted as drive letter V:\.
REM The below example is shown with an optional
REM parameter (-f) to forcefully disconnect the drive
REM letter.

```
sdcli snap unmount -d v -f
```

REM Use NTBackup to back up the snapinfo directory.
REM This backup appends the media so as not to
REM overwrite the database backup. The path to the
REM snapinfo directory is passed as the third
REM parameter on the command line used to launch
REM this script.

```
ntbackup backup %3 /T%1 /A
```

Command-line parameters:

This script can be invoked using the SnapManager Run Command After
Operation feature with the following command:

```
C:\SnapManager Scripts\scriptname.txt $ExchSnapshot  
$SnapInfoName $SnapInfoPath
```

These command-line parameters provide values to the script similar to these
examples:

- ◆ %1: exchsnap__SRVR3_01-20-2004_12.05.58__Daily
- ◆ %2: 01-20-2004_12.05.58__Daily
- ◆ %3: I:\NetApp SnapManager\SnapInfo\SRVR3\SG_First
Storage Group\01-20-2002_12.05.58__Daily

For more information about the Run Command After Operation feature, see
[“Using Run Command After Operation to archive automatically”](#) on page 167.

Archiving Exchange backups

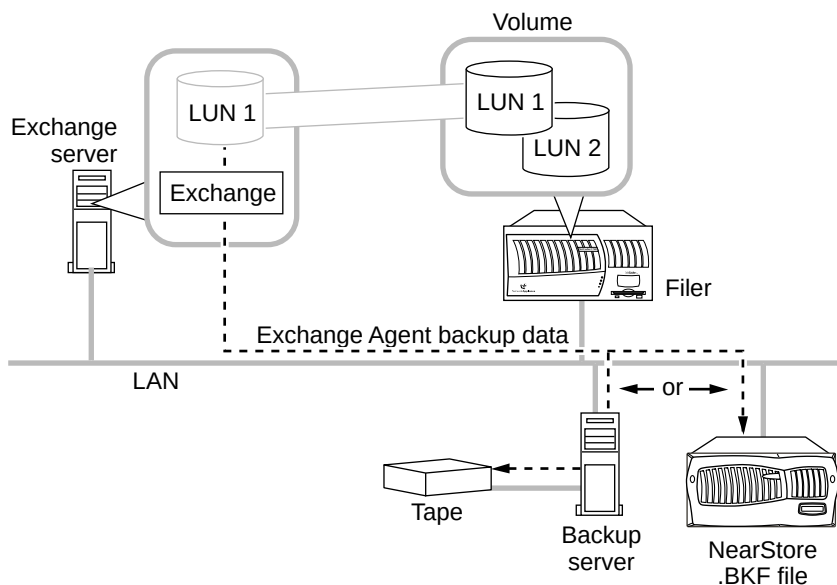
About this method

When you use Exchange backups to archive your SnapManager backups, you use NTBackup (which, in turn, uses the Exchange Backup Agent) to create a copy backup of your Exchange databases. In this case, the Exchange data itself is captured and archived. Because SnapManager is not used to create the backup, it also is not used to perform the restore, so the SnapInfo directory does not need to be archived for this method.

Caution

You must use a copy or differential backup for this method. Performing any other type of backup causes your existing SnapManager backups to become unusable for an up-to-the-minute restore.

This archive method is represented by the following diagram:



Archiving using Exchange backup

Advantages and disadvantages of this method

Using this approach provides the following advantages and disadvantages:

Advantages:

- ◆ The procedures and tools used for this method are probably familiar and available to you.

Disadvantages:

- ◆ No SnapManager backups can be initiated while this method is in use.

Usage example

The following script launches NTBackup and tells it to perform a copy-type backup through the Exchange backup agent.

Before you can use this script, you need to use the NTBackup GUI to create a .BKS file that contains the storage groups you want to back up. (The NTBackup command-line parameters /IS and /DS are for Exchange 5.5 only.)

This script assumes that it is being run on the computer running Exchange and SnapManager.

Script:

```
REM Launch NTBackup
```

```
ntbackup backup "@c:\MyConfig.BKS" /M copy
```

Note

Although this archive method does not use SnapManager backups, it can be invoked using the Run Command After Operation feature. For more information about the Run Command After Operation feature, see [“Using Run Command After Operation to archive automatically”](#) on page 167.

Using Run Command After Operation to archive automatically

About the Run Command After Operation feature

SnapManager 3.1 for Microsoft Exchange includes the capability to automatically run a command after a backup or verification is complete. The command-line parameters can be inserted based on the components of the backup or verification. This feature, called Run Command After Operation, enables you to automatically archive a backup.

Note

The command is run only after a successful backup or verification. If the backup is not completed successfully, or if the verification fails, the command is not run.

Types of SnapManager variables

To support the automatic archiving of a backup, which creates snapshots with variable names, SnapManager 3.1 for Microsoft Exchange provides the following SnapManager variables:

- ◆ **\$ExchSnapshot**

This variable expands to the name of an Exchange database snapshot, for example, `exchsnap__WINSRV5_01-06-2004_11.52.36`.

Note

The number of database snapshots in a SnapManager backup set depends on the number of volumes used to store the storage groups included in the backup.

- ◆ **\$InfoSnapshot**

This variable expands to the name of a SnapInfo directory snapshot, for example, `e_loginfo__WINSRV5_01-06-2004_11.52.36`.

- ◆ **\$SnapInfoName**

This variable expands to the name of the SnapInfo directory. If you use this variable, you must provide the correct path to the directory.

- ◆ **\$SnapInfoPath**

This variable expands to the complete path and name of the SnapInfo directory, for example:

```
I:\NetApp
SnapManager\SnapInfo\EXCH__WINSRV5\SG__First
Storage Group\WINSRV5_01-06-2004_11.52.36
```

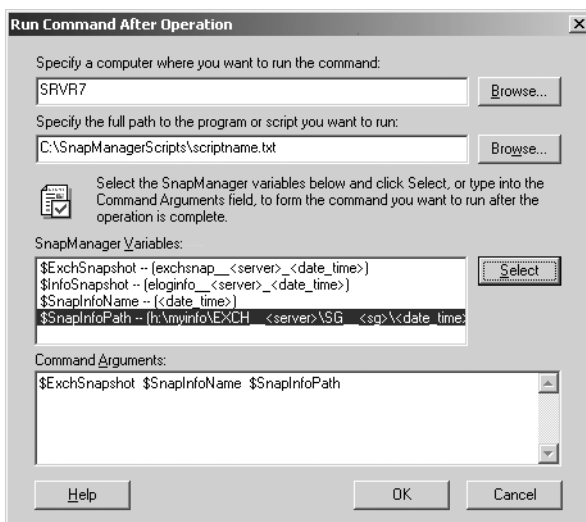
Note

The SnapInfoPath variable is automatically surrounded by double quotes so that it can contain spaces without affecting the script invocation on the Windows command line. If you do not want the double quotes to appear in your command line, remove them from the Command Arguments field in the Run Command After Operation window.

Example: In the following example, the script C:\SnapManagerScripts\scriptname would be invoked with the following parameters:

- ◆ exchsnap__WINSRV5_01-06-2004_11.52.36
- ◆ 01-06-2004_11.52.36
- ◆ I:\NetApp
SnapManager\SnapInfo\EXCH__WINSRV5\SG__First
Storage Group\WINSRV5_01-06-2004_11.52.36

The corresponding Run Command After Operation dialog box would look like this:



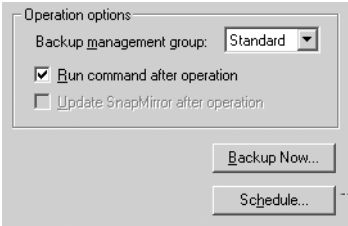
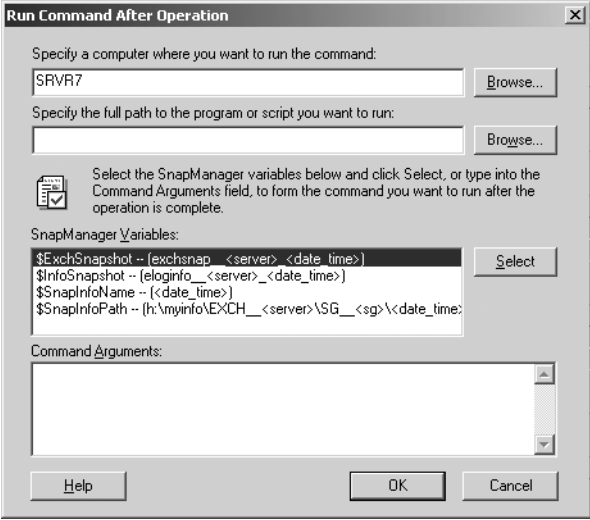
For more examples of command lines and scripts that use the SnapManager variables, see the examples for these archiving methods:

- ◆ [“Using NDMP or dump to archive SnapManager backups”](#) on page 158
- ◆ [“Using a Windows backup utility to archive SnapManager backups”](#) on page 162

Running a command after backup or verification

To run a command or invoke a batch file after backup or verification, complete the following steps.

Caution Make sure that you archive all components of a backup set together. For more information about SnapManager backup sets, see “[SnapManager backup sets](#)” on page 154 and “[SnapManager snapshot naming conventions](#)” on page 154.

Step	Action
1	When setting up your backup or verification in the Backup Wizard or Backup tab, select the Run Command After Operation check box.  Result: The Run Command After Backup Setup window is displayed before the operation is scheduled or initiated. 
2	Specify the computer where you want the command to be run.

Step	Action
3	Specify the full path of the command you want to run. Note_____ If the script is stored on a network share, use the UNC path rather than the network drive letter to specify the script's location.
4	In the Command Arguments field, specify the command arguments for the command or batch file invocation. You can type the arguments or, for SnapManager arguments, you can select them in the SnapManager Variables list and click Select to insert them in the Command Arguments field. Caution_____ If more than one snapshot exists for this operation, you must include that snapshot type's variable name once for every snapshot. If you do not, you cannot create a complete archive. For details, see "Types of SnapManager variables" on page 167. Note_____ If you often use the Run Command After Operation feature with the same arguments, you can specify a default value for the command arguments. For details, see "Specifying a default command setup" on page 170.
5	Click OK to return to the backup or verification setup process. Result: The command you specified, with the snapshot and snapinfo information for this backup inserted, runs when the backup or verification is complete.

Specifying a default command setup

If you run a particular command often, you can create a default command setup so that you don't have to enter the command information each time you initiate a backup or verification.

To specify a default command after operation setup, complete the following steps.

Step	Action
1	From the SnapManager main window, select Options > Default Run Command After Backup Setup. Result: The Run Command After Backup Setup window is displayed.
2	Enter the information for the command that you run most often. For details, see “Running a command after backup or verification” on page 169.
3	Click OK. Result: SnapManager verifies that the specified program exists on the specified system. SnapManager does not run the command at this time.

Performing Disaster Recovery with SnapManager 10

About this chapter

This chapter describes how you can prepare for disaster, and then use SnapManager and either SnapMirror or archiving to restore Exchange databases that were destroyed or compromised because of catastrophic conditions.

Guides you should read and have at hand

In addition to this guide, you should be familiar with the following guides and have them at hand, available for reference during disaster recovery:

- ◆ For information about how to connect to and use the LUNs stored in a mirrored destination volume, see your SnapDrive documentation.
- ◆ For information about administering Data ONTAP, see the *System Administration Storage Management Guide* for your version of Data ONTAP.
- ◆ For information about data replication using SnapMirror, see the *System Administration Data Protection Guide* for your version of Data ONTAP.
- ◆ For detailed information about disaster preparedness and recovery for Exchange 2000 or 2003, see the *Disaster Recovery for Microsoft Exchange 2000 Server* white paper published by Microsoft Corporation.

This document is available on the Microsoft Web site as Knowledge Base Article 326052.

- ◆ For detailed information about disaster preparedness and recovery for Exchange 5.5, see the *Microsoft Exchange 5.5 Disaster Recovery* white paper published by Microsoft Corporation.

This document is available on the Microsoft Web site as Knowledge Base Article 185078.

- ◆ For additional information about disaster recovery in the Microsoft environment, see
 - ❖ Microsoft Windows documentation
 - ❖ Microsoft Exchange documentation

Topics in this chapter

This chapter discusses the following topics:

- ◆ [“Preparing for disaster recovery”](#) on page 174
- ◆ [“Restoring your Exchange environment”](#) on page 180

Preparing for disaster recovery

Recommendations for disaster recovery preparation

Preparing for disaster ahead of time is key to recovering from it. The first steps to recovery from catastrophic failure of an Exchange database or filer should take place long before the event occurs.

Every environment and site is unique and every company has different requirements, depending on the amount of time recovery can take, archiving resources, and other factors. Taking these differences into account, consider the following general disaster recovery preparation recommendations:

- ◆ If you are using SnapMirror to mirror your data, keep the filer storing the destination SnapMirror volumes in a different physical location than your primary production system. In extreme cases, an entire site can be destroyed in a catastrophic event.
- ◆ If you are using archiving, the archive media, such as a NetApp NearStore® system or tape, should be located off site.
- ◆ Institute a policy of redundant knowledge by ensuring that more than one person knows how to restore the system.
- ◆ Record your Exchange data configuration, and keep detailed records and logs of changes you make to your Windows and Exchange environments. Keep hardcopy duplicates of these records off site.

Components required to restore your environment

To be able to reconstruct your Exchange environment after a catastrophic failure, you must be able to recover the following three components:

- ◆ Windows environment

You can either back up or replicate your Windows environment.

For more information about backing up your Windows environment, see [“Backing up your Exchange environment”](#) on page 176.

For more information about replicating your Windows environment, see [“Replicating your Exchange environment”](#) on page 177.

- ◆ Exchange server

You can either back up your Exchange server or reconstruct it using the Exchange recovery mode. To be able to reconstruct your Exchange server, you must have restored or replicated your Windows environment exactly.

For more information about backing up your Exchange server, see [“Backing up your Exchange server”](#) on page 176.

For more information about replicating your Windows environment, see [“Replicating your Exchange environment”](#) on page 177.

- ◆ Exchange data
You use SnapManager for Microsoft Exchange to create backups of your Exchange data, then move that data off site, either by archiving those backups or using SnapMirror to mirror them to another filer at a remote site.

Two methods to get Exchange data off site

You can use either of these methods to get your Exchange data off site for disaster recovery:

- ◆ You can use SnapMirror to mirror your filer data to a filer in another location.
For more information about using SnapMirror with SnapManager, see [“Using SnapMirror with SnapManager”](#) on page 145.
- ◆ You can archive the data to physical media, such as tapes, and store that media off site.
For more information about archiving Exchange data, see [“Archiving SnapManager Backups”](#) on page 153.

If you’re unsure which method to use, see the following table, which outlines advantages and disadvantages of each method:

Method to get Exchange data off site	Advantages	Disadvantages
Using SnapMirror	◆ Restoring from a SnapMirror destination is significantly faster than restoring from tape. ◆ The destination can be updated more frequently than tape, resulting in more current archives.	◆ Another filer is required in the remote location. ◆ WAN connectivity to the remote location is required.
Archiving SnapManager backups	◆ The required equipment might already be available and in use.	◆ Restoring from tape is significantly slower than restoring from a filer. ◆ Tapes must be stored and managed.

Backing up your Exchange environment

Backing up your Windows environment

SnapManager for Microsoft Exchange, the Exchange server, and the filers are dependent on the Windows environment. Before you can use any of the processes in this section, the Windows environment must be completely restored. Therefore, it is important that you back up your Windows environment so that you can restore the same state as part of the recovery process.

To back up your Windows environment, you must complete, at a minimum, the following high-level process.

Task	Process
1	Back up your Exchange server, including your Windows operating system and any applications running concurrently with the Exchange server.
2	Use your backup utility to create and maintain a current emergency repair disk (ERD).

Backing up your Exchange server

To ensure that you back up all the required components on your Exchange server, follow the process outlined in the appropriate Microsoft document: *Disaster Recovery for Microsoft Exchange 2000 Server* or *Microsoft Exchange 5.5 Disaster Recovery*.

Replicating your Exchange environment

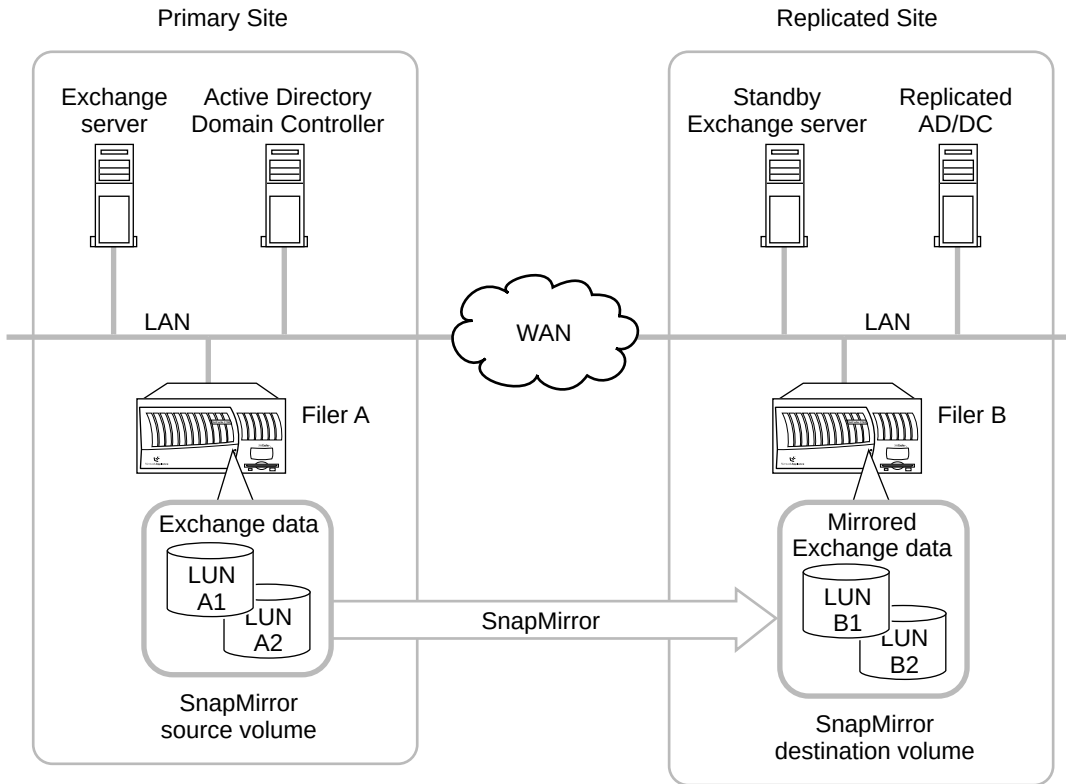
Reason to replicate your Exchange environment

If you want the ability to recover from a total site outage in a minimum amount of time, you can replicate your Exchange environment to a remote site. Then, if the primary site is destroyed, you can re-create your Exchange environment on the replicated site.

For more information about re-creating your Exchange environment on the replicated site, see [“Recovering both a failed filer and Exchange server to a replicated environment”](#) on page 204.

Example replicated site

The following diagram shows a typical Exchange site replication:



Example Site Replication

Note the following facts about this site configuration:

- ◆ The Windows environment (Active Directory, Domain Controller, etc.) is replicated through the Wide Area Network (WAN) to the replicated site. For more information about replicating your Windows environment and using a replicated environment to recover from a disaster, see your Windows documentation.
- ◆ The Exchange data on the filer is mirrored using SnapMirror to a filer on the replicated site. For more information about setting up SnapMirror, see your *Data ONTAP System Administration Data Protection Guide*.
- ◆ The standby Exchange server is configured identically to your primary Exchange server, except for the following differences:
 - ❖ It does *not* yet have Exchange installed.

- ❖ It is not yet a member of the domain (leave it in workgroup mode).
- ❖ It has a different name than the primary Exchange server.

Restoring your Exchange environment

Exchange environment recovery processes

Recovery from catastrophic loss of an Exchange environment that integrates SnapManager for Microsoft Exchange and NetApp filers is outlined in the following process.

Task	Process
1	Recovering the Windows environment All procedures in this document assume that you already recovered your Windows environment. For more information about recovering your Windows environment, see the Microsoft documentation listed in “Guides you should read and have at hand” on page 173.
2	Recovering the Exchange server This process is performed using the backup application you used to back up the Exchange server.
3	Recovering the Exchange databases This process is performed using SnapManager for Microsoft Exchange.

Rules and guidelines for disaster recovery

Before you perform disaster recovery using SnapManager for Microsoft Exchange, make sure that you understand the following rules and guidelines:

- ◆ If you archive only your database LUNs (and not the LUN containing the transaction logs), you will only be able to perform a point-in-time restore. The Exchange databases will be restored back to the time when the backup was created. Changes made to the databases after this time cannot be recovered.
- ◆ If you archive and restore your transaction log LUN along with the database LUNs, and the transaction log LUN contains transaction logs that accumulated after the archived backup was created, then you have the option of selecting an up-to-the-minute restore. In this case, the database would be restored up to the time when the archive was created. Changes made to the database after the archive was created cannot be recovered.

- ◆ If you are using SnapMirror, you can use an up-to-the-minute restore to restore your databases to the point in time of the last SnapMirror replication to the target volume containing the transaction logs LUN.
- ◆ If you are restoring from an archive, the LUN files from the archive must be restored into their original location in the active file system of the filer's volume.
- ◆ The drive letters assigned to the LUNs that are restored must be the same drive letters that were used when the archive was created.
- ◆ You cannot recover a LUN or transaction logs into a read-only file system, such as a snapshot.
- ◆ For SnapManager Restore to work properly, SnapManager for Microsoft Exchange and SnapRestore must be licensed on the filer that stores the Exchange databases.
- ◆ The recovery processes in this guide do not address a large-scale disaster in which supporting Windows infrastructure, such as Active Directory and DNS, is damaged or lost. Before attempting recovery of the Exchange server or the filer, you must recover the supporting infrastructure.

Which recovery procedure to use

You can use the following table to determine which recovery process most closely matches your needs.

If...	Then use...
You want to recover Exchange databases from a SnapMirror destination volume	“Recovering Exchange data using SnapMirror” on page 186
Your Exchange server is online and you want to recover Exchange databases from archive	“Recovering Exchange data using archives” on page 183
Your filer volume has failed or been destroyed and you used archiving	“Restoring a filer volume using SnapManager backup archives” on page 188
Your Exchange server has failed or been destroyed	“Recovering a failed Exchange server” on page 189
Both your Exchange server and your filer have failed and you want to recover on the same hardware	“Recovering both a failed filer and a failed Exchange server” on page 197

If...	Then use...
Both your Exchange server and your filer have failed or been destroyed, and you want to recover your Exchange environment using a replicated environment on a new Exchange server	“Recovering a failed filer and server to a replicated environment” on page 204

Recovering Exchange data using archives

Restoring databases from archive

To restore the Exchange databases from an archive of a SnapManager backup set, complete the following steps.

Step	Action
Prepare your environment	
1	Identify and locate the archived backup set that you want to restore.
2	If your Exchange databases are still mounted, dismount all databases belonging to the storage group to be restored.
3	Note the drive letter belonging to the storage group to be restored from archive.
4	As an extra safety measure, use SnapDrive to manually create a snapshot of the LUNs to be restored from archive.
5	Use SnapDrive to delete the LUNs to be restored to avoid a file name conflict when the LUNs are restored from archive.
Restore filer data	
6	Using the archive tool you used to create the archive, restore the archived LUNs to the filer volume.
7	Use SnapDrive to connect to the restored LUNs, using the same drive letters you used before.
8	Verify that the reconnected LUNs are accessible.

Step	Action
9	Restore the SnapInfo directory and all of its contents from the archive to a temporary location accessible from the SnapManager host. SnapManager requires the SnapInfo directory to restore from the archive, and will request this location in a later step. Note_____ You might have archived only the SnapInfo directory or the entire LUN containing it. In either case, you now need access only to the SnapInfo directory on that LUN or to a copy of the SnapInfo directory.
Restore Exchange data	
10	Exit SnapManager if it is running, and restart it in Restore From Archive mode by opening a command window and using the following command-line flag: restorearchive Example: C:\Program Files\SnapManager For Microsoft Exchange\SnapManager.exe -restorearchive Note_____ Use this SnapManager mode only to restore SnapManager archives. Before performing any other SnapManager operations, close SnapManager and restart it without the command-line flag. Result: The SnapManager Restore From Archive window is displayed.
11	In the Restore From Archive window, enter or browse to the path where the SnapInfo directory was restored. The path to the restored SnapInfo directory includes the following components: \snapinfo\server_name\storage_group_name\snapshot_name. The <i>snapshot_name</i> should be the same name as the snapshot from which the LUN file for the database was archived.

Step	Action
12	Click OK.
13	In the Restore From Archive window, double-click to select the backup set that you want to restore.
14	Click Start Restore. If the backup is not verified, you are prompted whether to verify it. Note_____ You can override the verification requirement; however, NetApp strongly recommends that only verified backups are used for restore. _____
15	Click Yes to continue.
16	Click Start Now to begin the restore process.
17	After the restore is complete, launch the Outlook® client and verify that your data was properly restored and that the Exchange server is operating correctly.
18	Perform a SnapManager backup and verification to verify that your restored database is free of physical-level corruption.

Recovering Exchange data using SnapMirror

About recovery of a failed filer volume using SnapMirror

This section explains how to recover LUNs from a failed volume on a filer or a failed filer using SnapMirror. These LUNs contain the snapshots of the databases to be restored.

You can configure SnapMirror to use a destination volume on the same filer or a different, remote filer. Whether the destination volume is on the same filer as the failed volume or a different one, the procedure you follow to recover is largely the same.

Recovering Exchange data from a SnapMirror volume

To recover Exchange data using a SnapMirror destination volume, complete the following steps.

Step	Action
1	Identify the destination mirror volume so that you know the volume to mount when you encounter that step.
2	Ensure that the filer hosting the SnapMirror destination volumes is online and that the volumes are available and shared through CIFS. For information about creating CIFS shares, see your SnapDrive documentation. For information about general filer administration, see your <i>Data ONTAP System Administration Storage Management Guide</i> .
3	Make sure that all databases that are stored on LUNs on the failed volume are dismounted. For information about dismounting stores, see the Microsoft Exchange documentation.

Step	Action
4	From the SnapDrive MMC, disconnect the LUNs that resided on the failed volume. Take note of the drive letters that were used for these disks. For information about disconnecting LUNs, see your SnapDrive documentation. Note _____ If you are unable to disconnect a LUN, it might contain databases that are still online, or there could be another application that is still accessing that LUN.
5	From the SnapDrive MMC, connect to the LUN files in the active file system of the SnapMirror destination volume. Note _____ Do not mount the Exchange databases yet. The SnapManager Restore process mounts the databases. If you get an error when connecting, such as “Disk is in exclusive use,” use FilerView to ensure that the LUN is unmapped from all igroups and online. _____ For information about connecting LUNs, see your SnapDrive documentation. Result: A Single File Snap Restore (SFSR) is automatically performed, using the most recent snapshot (which could have been created by SnapDrive or SnapManager).
6	Run SnapManager and use SnapManager Restore to restore the most recent backup for each storage group. For more information about using SnapManager Restore, see “Restoring Databases with SnapManager Restore” on page 129.
7	Launch the Outlook client and verify that your data was properly restored and that the Exchange server is operating correctly.
8	Perform a SnapManager backup and verification to verify that your restored database is free of physical-level corruption.

Restoring a filer volume using SnapManager backup archives

About recovery of a filer volume from archives

This scenario explains how to recover LUNs from a failed filer volume or a failed filer using archived SnapManager backups.

Recovering a filer volume from archives

To recover a failed filer volume using SnapManager backup archives, complete the following steps.

Step	Action
1	Recover the filer so that it is online and available. For information about bringing the filer online and making it available to your client, see the <i>Software Setup Guide</i> and <i>System Administration Storage Management Guide</i> for your version of Data ONTAP.
2	Prepare the archive media and the backup application so that they are ready to be used for the recovery. If you are using a NearStore system, ensure that the data is accessible.
3	Perform the procedure for archive recovery described in “ Restoring databases from archive ” on page 183.

Recovering a failed Exchange server

About recovering a failed Exchange server

To recover an Exchange server, you must use NTBackup or a third-party backup and restore application, relying on its documentation for direction. To recover the Exchange databases, you use SnapManager.

This procedure assumes that backups of the Exchange server were made; it also assumes that the most recent backup includes the system state of the Exchange server just before the disaster occurred.

Recovering a failed Exchange 2000 or 2003 server

To recover a failed Exchange 2000 or 2003 server, complete the following steps.

If you are restoring to different hardware, you might need to refer to one of the following Microsoft Knowledge Base articles, as appropriate for your operating system:

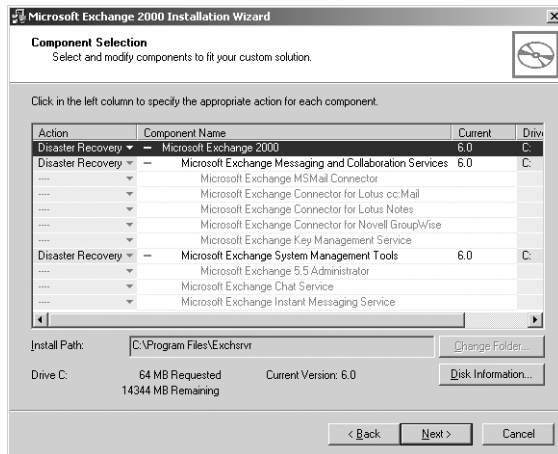
- ◆ For Exchange 2000, KB article 297289
- ◆ For Exchange 2003, KB article 822945

Steps	Action
1	Ensure that the filer is online and that the volumes containing the LUN files are available across CIFS. For information about creating CIFS shares, see your SnapDrive documentation. For information about general filer administration, see the <i>System Administration Storage Management Guide</i> for your version of Data ONTAP.

Steps	Action	
2	The server you restore Exchange on does not need to be the same hardware you were running Exchange on before the disaster. However, it must have the same name as the previous Exchange server, and it must have sufficient capacity.	
	If...	Then...
	You are restoring your Exchange server back to the same hardware	Proceed to Step 3 .
	You are restoring your Exchange server to a brand new server	Name the new server using the same name as the original Exchange server and proceed to Step 3. Note_____ If you are restoring from tape, your new hardware configuration must match the old hardware configuration <i>exactly</i>, including interface cards and firmware versions.
	You are restoring your Exchange server to a different, preexisting server	Reset the machine account in the domain and name the server, using the same name as the original Exchange server, and proceed to Step 4. For more information about performing this step, see the appropriate Microsoft KB article, as listed before this procedure. Caution_____ Do not install Exchange at this time. Use the KB article only to rename the server. Make sure that you perform the account reset, as specified in the KB article, rather than deleting the account and re-creating it.

Steps	Action	
3	Perform a full restore of the Exchange server, without the Exchange databases, using the backup application you used to create the backup. See the documentation for your backup software and the <i>Disaster Recovery for Microsoft Exchange 2000 Server</i> document.	
4	If...	Then...
	Your backup software backed up the SnapDrive software	Proceed to Step 5 .
	Your backup software was not configured to back up the SnapDrive software	Reinstall the same version of SnapDrive used before the disaster occurred. For information about installing SnapDrive, see your SnapDrive documentation.
5	If your Exchange server is running Windows 2003 and...	Then...
	Your backup software backed up NetApp VSS Hardware Provider	Proceed to Step 6 .
	Your backup software was not configured to back up NetApp VSS Hardware Provider	Reinstall the same version of NetApp VSS Hardware Provider used before the disaster occurred. For information about installing NetApp VSS Hardware Provider, see the <i>NetApp VSS Hardware Provider Installation and Administration Guide</i>.
6	Using SnapDrive, connect the LUNs, or ensure that they are connected, and that you are using the same drive letters used before the disaster.	

Steps	Action	
7	If...	Then...
	Your backup software backed up the Exchange Server software	Proceed to Step 8 .
	Your backup software was not configured to back up the Exchange Server software	Install Exchange and any required Exchange service packs <i>in disaster recovery mode</i>. For details, see <i>Disaster Recovery for Microsoft Exchange 2000 Server</i> and the appropriate KB article, as listed before this procedure. Note_____ Do not mount any storage groups yet. _____



Steps	Action	
8	If...	Then...
	Your backup software backed up the SnapManager software	Proceed to Step 9 .
	Your backup software was not configured to back up the SnapManager software	Reinstall the same version of SnapManager used before the disaster and run the Configuration Wizard to ensure that your configuration matches exactly the configuration used before the disaster. Note————— Because you are reconstructing your original configuration, no data is moved by the Configuration Wizard. However, running the Configuration Wizard is necessary for SnapManager to function correctly. —————
9	Restore the most recent backup using SnapManager Restore. For more information about using SnapManager Restore, see “ Restoring Databases with SnapManager Restore ” on page 129.	
10	Launch the Outlook client and verify that your data was properly restored and that the Exchange server is operating correctly.	
11	Perform a SnapManager backup and verification to verify that your restored database is free of physical-level corruption.	

Recovering a failed Exchange 5.5 server

To recover a failed Exchange 5.5 server, complete the following steps.

Steps	Action	
1	Ensure that the filer is online and that the volumes containing the LUN files are available across CIFS. For information about creating CIFS shares, see your SnapDrive documentation. For information about general filer administration, see the <i>System Administration Storage Management Guide</i> for your version of Data ONTAP.	
2	The server you restore Exchange on does not need to be the same hardware you were running Exchange on before the disaster. However, it must have the same name as the previous Exchange server, and it must have sufficient capacity.	
	If...	Then...
	You are restoring your Exchange server back to the same hardware	Proceed to Step 3 .
	You are restoring your Exchange server to a brand new server	Reset the machine account in the domain and name the new server using the same name as the original Exchange server. Proceed to Step 3. Note_____ If you are restoring from tape, your new hardware configuration must match the old hardware configuration <i>exactly</i>.
	You are restoring your Exchange server to a different, preexisting server	Reset the machine account in the domain and rename the server, using the same name as the original Exchange server. Proceed to Step 3 .

Steps	Action	
3	Perform a full restore of the Exchange server, without the Exchange data, using the backup application you used to create the backup. See the documentation for your backup software and the <i>Microsoft Exchange 5.5 Disaster Recovery</i> document.	
4	If...	Then...
	Your backup software backed up the SnapDrive software	Proceed to Step 5 .
	Your backup software was not configured to back up the SnapDrive software	Reinstall the same version of SnapDrive used before the disaster occurred. For information about installing SnapDrive, see your SnapDrive documentation.
5	Using SnapDrive, connect the LUNs, or ensure that they are connected, and that you are using the same drive letters used before the disaster.	
6	If...	Then...
	Your backup software backed up the Exchange server	Proceed to Step 7 .
	Your backup software was not configured to back up the Exchange server	Reinstall Exchange and any required service packs. Use the same site and organization names as your original Exchange installation. Note _____ Do not start the Information Store service yet. _____

Steps	Action	
7	If...	Then...
	Your backup software backed up the SnapManager software	Proceed to Step 8 .
	Your backup software was not configured to back up the SnapManager software	Reinstall the same version of SnapManager used before the disaster and run the Configuration Wizard to ensure that your configuration matches exactly the configuration used before the disaster. Note————— Because you are reconstructing your original configuration, no data is moved by the Configuration Wizard. However, running the Configuration Wizard is necessary for SnapManager to function correctly.
8	Restore the most recent backup using SnapManager Restore. For more information about using SnapManager Restore, see “Restoring Databases with SnapManager Restore” on page 129.	
9	Launch the Outlook client and verify that your data was properly restored and that the Exchange server is operating correctly.	
10	Perform a SnapManager backup and verification to verify that your restored database is free of physical-level corruption.	

Recovering both a failed filer and a failed Exchange server

About recovery of both a failed filer and Exchange server

If both the filer and the Exchange server fail, in most cases, you should recover the filer first so that the data—or the space to recover the data—is available.

Successful recovery of the Exchange server depends on the existence of following components:

- ◆ A recent, usable backup of the Exchange server or a replicated Windows environment to enable the re-creation of the Exchange server
- ◆ Archive of a recent, verified SnapManager backup set or SnapMirror destination volumes containing the SnapManager backup set

Which failed filer and server recovery procedure to use

The procedure you use to recover both a failed filer and a failed Exchange server depends on whether you employed SnapMirror or archiving. Use the appropriate procedure, as follows.

If you employed...	Then use...
SnapMirror	“Recovering both a failed filer and Exchange server using SnapMirror” on page 197
Archiving	“Recovering both a failed filer and Exchange server using archiving” on page 200

Recovering both a failed filer and Exchange server using SnapMirror

To recover both the filer and the Exchange server using SnapMirror replication, complete the following steps.

Step	Action	
1	Ensure that the filer hosting the SnapManager destination volumes is online and that the volumes are available and shared through CIFS. For information about creating CIFS shares, see your SnapDrive documentation. For information about general filer administration, see the <i>Data ONTAP System Administration Storage Management Guide</i> for your version of Data ONTAP.	
2	Perform a full restore of the Exchange server, without the Exchange databases, using the backup application you used to create the backup. For more information about restoring your Exchange server, see the documentation for your backup software and the appropriate Microsoft disaster recovery document as described in “Guides you should read and have at hand” on page 173. Note_____ If a backup of the Exchange server is not available and your Windows environment is an exact duplicate of the environment before the failure, you can reconstruct the Exchange server. For details, see “Recovering a failed filer and server to a replicated environment” on page 204, using your new environment as the replicated environment.	
3	If...	Then...
	Your backup software backed up SnapDrive	Proceed to Step 4 .
	Your backup software was not configured to back up SnapDrive	Reinstall the same version of SnapDrive used before the disaster occurred. For information about installing SnapDrive, see your SnapDrive documentation.

Step	Action	
4	If your Exchange server is running Windows 2003 and...	Then...
	Your backup software backed up NetApp VSS Hardware Provider	Proceed to Step 5 .
	Your backup software was not configured to back up NetApp VSS Hardware Provider	Reinstall the same version of NetApp VSS Hardware Provider used before the disaster occurred. For information about installing NetApp VSS Hardware Provider, see the <i>NetApp VSS Hardware Provider Installation and Administration Guide</i>.
5	From the MMC on the Exchange server, use SnapDrive to connect to the LUNs in the active file system of the SnapMirror destination volume. Make sure that you use the same drive letters for the same LUNs as your original configuration. Note Do not mount the Exchange databases yet. The SnapManager Restore process mounts the databases. If you get an error when connecting, such as “Disk is in exclusive use,” use FilerView to ensure that the LUN is unmapped from all igroups and online. For information about connecting LUNs, see your SnapDrive documentation. Result: The mirror is broken and an SFSR is performed, restoring the LUNs from the most recent SnapManager or SnapDrive snapshot. Another SFSR will be performed in a later step, during the SnapManager restore.	

Step	Action	
6	If...	Then...
	Your backup software backed up SnapManager	Proceed to Step 7 .
	Your backup software was not configured to back up SnapManager	Reinstall the same version of SnapManager used before the disaster and run the Configuration Wizard to ensure that your configuration matches exactly the configuration used before the disaster. Note _____ Because you are reconstructing your original configuration, no data is moved by the Configuration Wizard. However, running the Configuration Wizard is necessary for SnapManager to function correctly.
7	Restore the most recent backup using SnapManager Restore. For more information about using SnapManager Restore, see “Restoring Databases with SnapManager Restore” on page 129.	
8	Launch the Outlook client and verify that your data was properly restored and that the Exchange server is operating correctly.	
9	Perform a SnapManager backup and verification to verify that your restored database is free of physical-level corruption.	

Recovering both a failed filer and Exchange server using archiving

To recover both the filer and the Exchange server using archiving, complete the following steps.

Step	Action	
1	Bring the failed filer back online.	
2	Perform a full restore of the Exchange server, without the Exchange data, using the backup application you used to create the backup. For more information about restoring your Exchange server, see the documentation for your backup software and the appropriate Microsoft disaster recovery document as described in “Guides you should read and have at hand” on page 173. Note— If a backup of the Exchange server is not available and your Windows environment is an exact duplicate of the environment before the failure, you can reconstruct the Exchange server. For details, see “Recovering a failed filer and server to a replicated environment” on page 204, using your new environment as the replicated environment.	
3	If...	Then...
	Your backup software backed up SnapDrive	Proceed to Step 4 .
	Your backup software was not configured to back up SnapDrive	Reinstall the same version of SnapDrive used before the disaster occurred. For information about installing SnapDrive, see your SnapDrive documentation.
4	Using the archive tool you used to create the archive, restore the archived database LUNs to the filer volume.	

Step	Action	
5	If...	Then...
	You archived the LUNs containing the SnapInfo directory and the transaction logs	Restore these LUNs.
	You did not archive the LUNs containing the SnapInfo directory and the transaction logs	Create new LUNs using the same drive letters as your original configuration, in the same volumes as they were before.
6	Using SnapDrive on the Exchange server, connect to the LUNs you restored from archive with the same drive letters as your original configuration. Note_____ Do not mount the Exchange databases yet. The SnapManager Restore process mounts the databases. _____	

Step	Action	
7	If...	Then...
	Your backup software backed up SnapManager	Proceed to Step 8 .
	Your backup software was not configured to back up SnapManager	Reinstall the same version of SnapManager used before the disaster and run the Configuration Wizard to ensure that your configuration matches exactly the configuration used before the disaster. Note _____ Because you are reconstructing your original configuration, no data is moved by the Configuration Wizard. However, running the Configuration Wizard is necessary for SnapManager to function correctly. _____
8	Perform the procedure for archive recovery described in “ Restoring databases from archive ” on page 183, starting with Step 9 .	

Recovering a failed filer and server to a replicated environment

Recovering both a failed filer and Exchange server to a replicated environment

To recover both the filer and the Exchange server to a replicated environment, complete the following steps.

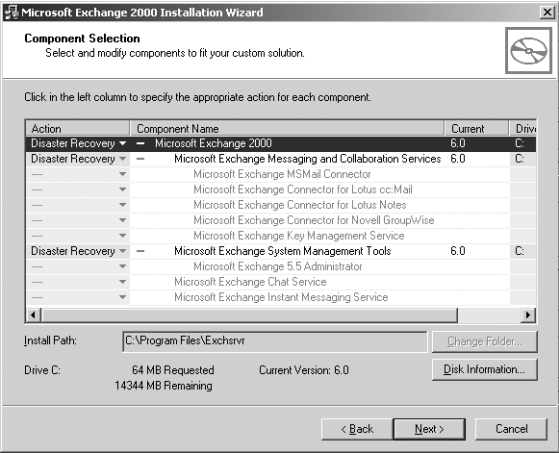
Note

This procedure assumes that you have your Windows environment replicated, as described in “[Replicating your Exchange environment](#)” on page 177. This includes a replicated Active Directory Domain Controller, so your supporting Windows environment matches your previous environment exactly.

For this configuration, the term “original Exchange server” refers to the Exchange server running in your original environment that has failed. The term “recovery Exchange server” refers to the Windows host that will run Exchange in the replicated environment after you complete this procedure.

Step	Action
1	Ensure that you have <code>rsh</code> access to the filer hosting the SnapMirror destination volumes. For more information about managing access from administration hosts, see the <i>System Administration Storage Management Guide</i> for your version of Data ONTAP.
2	Ensure that the filer hosting the SnapMirror destination volumes is online and that the volumes are available and shared through CIFS. For information about creating CIFS shares, see your <i>Data ONTAP System Administration File Access Management Guide</i>. For information about general filer administration, see your <i>Data ONTAP System Administration Storage Management Guide</i>.

Step	Action
3	Follow the steps in the appropriate Microsoft Knowledge Base article to reset the computer account and rename the standby Exchange server in your new environment to the name of the original Exchange server: ◆ If your original Exchange server was running Exchange 2000, use KB article 297289. ◆ If your original Exchange server was running Exchange 2003, use KB article 822945. ◆ If your original Exchange server was running Exchange 5.5, simply perform an account reset. Caution_____ Do not install Exchange yet. This is done in a later step. Make sure that you perform an account reset, rather than deleting the account and re-creating it.
4	Make sure that the same version of SnapDrive that was running on your original Exchange server is installed on your standby Exchange server.
5	From the MMC on the standby Exchange server, use SnapDrive to connect to the LUNs in the active file system of the SnapMirror destination volume. Make sure that you use the same drive letters for the same LUNs as your original configuration. For information about connecting LUNs, see your SnapDrive documentation. Note_____ If you get an error when connecting, such as “Disk is in exclusive use,” use FilerView to ensure that the LUN is unmapped from all igroups and online. Result: The mirror is broken and a Single File Snap Restore (SFSR) is performed using the most recent SnapDrive snapshot.

Step	Action	
6	If...	Then...
	Your original Exchange Server was running Exchange 2000 or 2003	Using the Microsoft Knowledge Base article you used in Step 3, install Exchange and any required Exchange service packs <i>in disaster recovery mode</i> on your standby Exchange server.
		
	Your original Exchange Server was running Exchange 5.5	Install Exchange 5.5, using the same site and organization names as your original Exchange server, and then apply any required service packs.
	Result: When you complete this step, your standby Exchange server should be running exactly the same version of Exchange, including service packs, as your original Exchange server.	
	Result: When you complete this step, your standby Exchange server should be running exactly the same version of Exchange, including service packs, as your original Exchange server.	

Step	Action
7	On the standby Exchange server, install the same version of SnapManager as was running on your original Exchange server.
8	Launch SnapManager and run the SnapManager Configuration Wizard to ensure that the correct configuration is used. If necessary, modify the configuration so that it matches exactly the configuration before the failure.
9	Restore the most recent backup using SnapManager Restore. For more information about using SnapManager Restore, see “Restoring Databases with SnapManager Restore” on page 129.
10	Launch the Outlook client and verify that your data was properly restored and that the standby Exchange server, which now becomes your primary Exchange server, is operating correctly.
11	After you repair or replace your primary site, you can return to your original configuration. For more information about returning to your original site replication configuration, see “Returning to your original site replication configuration” on page 207.

Returning to your original site replication configuration

If you needed to perform disaster recovery using a replicated site, you probably want to return to your original site replication configuration. Because Exchange is now running on the replicated site, you must perform this operation correctly to avoid data loss as you switch back over to the original site.

To return to using Exchange on your primary site after you perform disaster recovery using your replicated site, complete the following steps.

Note

In this procedure, your original primary site is called the primary site (although before you perform the procedure, it is not running Exchange), and the site and server you are currently running Exchange on are called the replicated site and the standby Exchange server.

This procedure references two Microsoft Knowledge Base articles. The article that you use depends on your version of Exchange. For Exchange 2000, use Article 297289. For Exchange 2003, use Article 822945. No corresponding article is needed for Exchange 5.5.

Caution

Do not install any application software on the primary site until instructed to do so.

Step	Action
Prepare primary site	
1	Repair or replace the filer on your primary site. For more information about setting up your filer, see the <i>System Administration Storage Management Guide</i> for your version of Data ONTAP.
2	Reconstruct the Windows environment, including the Active Directory Domain Controller, on your primary site by replicating the environment back from the replicated site.
Create temporary mirror	

Step	Action
3	Using SnapMirror, create a mirror with the replicated site as the (temporary) source and the primary site as the (temporary) destination. Note_____ Remember that a destination volume must be at least as large as its source volume. If your original destination volume was larger than your original source volume, you need to increase the size of the temporary destination volume to match the size of the temporary source volume. If your original primary filer was not affected by the disaster, you can use the <code>snapmirror resync</code> command to perform this step more quickly. For more information about this command, see the <i>System Administration Data Protection Guide</i> for your version of Data ONTAP.
Capture Exchange data	
4	On the standby Exchange server, perform a SnapManager backup and verification of all storage groups.
5	Block all user access to Exchange. Note_____ This step is necessary because all changes to the Exchange data store made after the mirror is updated are lost when you switch over to the primary site.
6	Use SnapDrive to perform an update mirror operation using the following <code>sdcli</code> command once for every volume containing Exchange or SnapInfo data: <code>sdcli snap update_mirror -d drive</code> For more information about the SnapDrive command-line interface, see your SnapDrive documentation.
7	Shut down the standby Exchange server.
Reconstruct primary Exchange server	

Step	Action	
8	If...	Then...
	Your original Exchange server was running Exchange 2000 or 2003	Using the appropriate Microsoft Knowledge Base Article for your version of Exchange, reset the machine account in the domain. Caution————— Make sure that you perform the account reset, as specified in the Knowledge Base article, rather than deleting the account and re-creating it.
	Your original Exchange server was running Exchange 5.5	Rename the primary Exchange server to its original name.
9	Install and configure Windows on the primary Exchange server. Caution————— If you repaired the original Exchange server, wipe its disks and reinstall the operating system. Do not attempt to bring the server back online with the original software.	
10	Install any Windows service packs that were installed on the primary Exchange server.	
11	Ensure that you have rsh access to the newly reconstructed or repaired filer.	
12	Install and configure SnapDrive on the primary Exchange server.	

Step	Action	
13	Using SnapDrive, connect to the LUNs in the active file system of the newly reconstructed or repaired filer. Caution————— Be sure you use the same drive letters that were used in your original primary site, and as should be in use in your recovery site. Result: The reverse direction mirror you created in Step 3 is broken and an SFSR is performed.	
14	If...	Then...
	Your original Exchange server was running Exchange 2000 or 2003	Using the appropriate Microsoft Knowledge Base Article for your version of Exchange, install Exchange and any required Exchange service packs <i>in disaster recovery mode</i> on the primary Exchange server.
	Your original Exchange server was running Exchange 5.5	Install Exchange and any required service packs on the primary Exchange server, using the same site and organization names as your original configuration.
15	Install the same version of SnapManager for Microsoft Exchange that was installed on the primary Exchange server.	
16	Launch SnapManager and run the SnapManager Configuration Wizard, making sure to keep all data on the same drives where it was before.	
Restore and verify Exchange data		
17	Use SnapManager Restore to restore the backup you created in Step 4 .	

Step	Action
18	Launch the Outlook client and verify that your data was properly restored and that the new primary Exchange server is operating correctly.
Re-create mirror	
19	Delete the (reversed) mirror configuration you created in Step 3 .
20	Re-create your original mirror, with your newly reconstructed filer as the source, and the replicated site as the destination.
Reconfigure replicated site	
21	Return your standby Exchange server to standby mode by performing these steps: - Wipe the disks. - Using a different name than the primary Exchange server, reinstall the correct version of the operating system and any required service packs. - Place the standby Exchange server into a workgroup. (This step is optional.) Result: Your replicated site is ready once again in case of the loss of or damage to your primary site.

About this chapter This chapter describes how to use and manage SnapManager reports for all your SnapManager operations.

Topics in this chapter This chapter discusses the following topics:

- ◆ “[Understanding SnapManager reports](#)” on page 214
- ◆ “[Deleting SnapManager reports](#)” on page 216
- ◆ “[Printing SnapManager Reports](#)” on page 217

Understanding SnapManager reports

Contents of SnapManager Reports

SnapManager reports list step-by-step details for every SnapManager operation you perform, the final status of the operation, and error messages for any errors encountered during the operation.

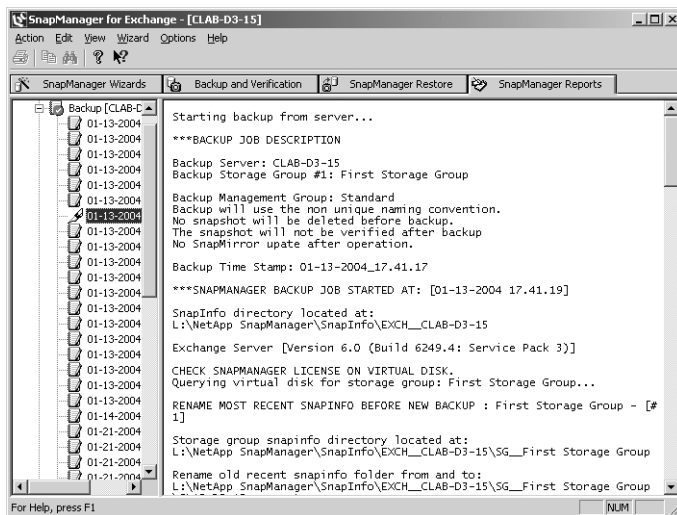
The SnapManager Reports tab provides four folders, which contain the reports for each of these operation types:

Note

There could be other folders if you are running SnapManager in a Windows cluster or you have a previous version of SnapManager Reports.

- ◆ Backup
- ◆ Config
- ◆ Delete Snapshot
- ◆ Miscellaneous
- ◆ Restore

The following illustration shows a report for a backup.



About changing the report directory

You can use the Options > Report Directory Setting menu to change the directory where your SnapManager reports are stored. You might want to do this if you find that you have limited space in the original report directory.

If you change the path, you can no longer see the reports created before the path was changed, but they are still accessible. You can look at them by changing the Report Directory Setting back to the original setting and selecting Refresh from the View menu.

About locating the report directory in a Windows cluster

By default, the report directory is in the disk where SnapManager is installed. In a Windows cluster, however, this does not allow the report directory to be shared between the nodes in the cluster, and you cannot see the same reports from different nodes. To avoid this problem, you can use the Options menu to move the report directory to a disk that belongs to the same group as your Exchange virtual server. This needs to be performed from every SnapManager node.

Caution

Do not use a disk that contains Exchange or SnapManager data for the report directory; it is restored from snapshot when you perform a SnapManager Restore.

Deleting SnapManager reports

Deleting a SnapManager report

To delete any of the reports from the Reports folders, complete the following steps.

Step	Action
1	Click the SnapManager Reports tab in the SnapManager main window.
2	Expand the appropriate folder in the left column of the Report tree.
3	Right-click the report that you want to delete and select Delete Report.
4	Click the dialog box that appears, prompting for whether you want to delete the report. Result: The report is deleted.

Printing SnapManager Reports

Ways to print reports

SnapManager for Microsoft Exchange provides the following two ways to print reports:

- ◆ Directly to the printer from within the displayed report on the right pane using the context menu
- ◆ From within Notepad

Printing a displayed report to the printer

To send a displayed report to the printer, complete the following steps.

Step	Action
1	Click the SnapManager Reports tab in the SnapManager main window.
2	Expand the appropriate reports folder and select the report you want to print.
3	Right-click anywhere within the displayed report in the right pane and select Print.

Printing a report using Notepad

To print a report using Notepad, complete the following steps.

Step	Action
1	Click the SnapManager Reports tab in the SnapManager main window.
2	Expand the appropriate report folder.
3	Right-click the report name in the folder pane and select Open with Notepad.
4	From within Notepad, select the Print option on the File menu.

About this chapter This chapter describes the options for e-mail notification and Filer Syslog and Autosupport services.

Topics in this chapter This chapter discusses the following topics:

- ◆ “[Configuring e-mail notification](#)” on page 220
- ◆ “[Configuring filer SysLog and Autosupport](#)” on page 224

Configuring e-mail notification

About event notification settings

You can use the Notification Setting option of the SnapManager Options menu to display the Auto Notification Settings window that you use to set options for e-mail notification and filer SysLog and Autosupport services. If these options are set, they convey information about errors and other events that occur related to SnapManager for Microsoft Exchange to a designated recipient.

Note_____

By default, all notifications are disabled.

Information that e-mail notification provides

The SMTP Mail Setup tab of the Auto Notification Settings window enables you to configure SnapManager to notify you through e-mail (using SMTP) of the success or failure of the following operations:

- ◆ SnapManager backup
- ◆ Database integrity verification

Note_____

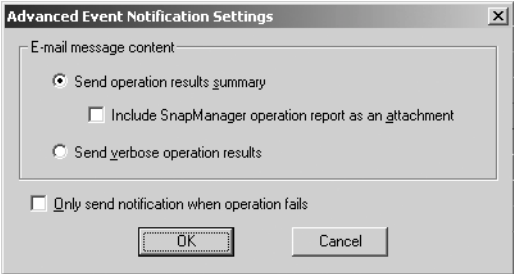
SnapManager Restore and Configuration Wizard operations are not reported through the SMTP e-mail notification system. However, they are reported through Autosupport. For more information about configuring SysLog and Autosupport, see “[Configuring filer SysLog and Autosupport](#)” on page 224.

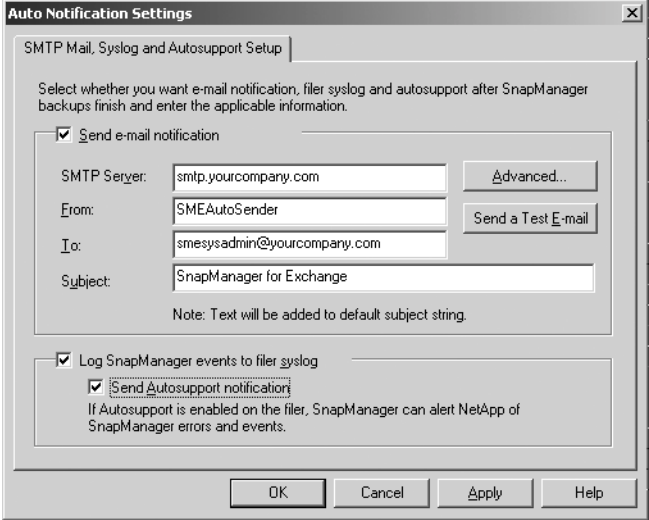
Enabling e-mail notification

To enable e-mail notification, complete the following steps.

Step	Action
1	Select Options > Notification Setting from the SnapManager main menu. Result: The Auto Notification Settings window is displayed.

Step	Action
2	Select the Send E-mail Notification check box. Note————— SnapManager requires an external mail host at your site to send mail. The mail host is a host that runs a mail server that listens on the SMTP port (25).
3	Provide the following information in the SMTP Mail Setup tab fields of the Auto Notification Settings window: ◆ SMTP Server The name or the IP address of the SMTP e-mail server or gateway to be used. ◆ From The e-mail address of the sender of the notification. By default, the name <code>SMEAUTOSENDER</code> is used. To specify a sender other than the default, use the following format: <i>Sender</i><name@yourcompany.com> or <i>Sender</i> or name@yourcompany.com ◆ To The e-mail address of the recipient to whom the notification is to be sent. For more than one recipient, use a semicolon (;) to separate the addresses. ◆ Subject The subject line text to be appended to the following standard subject line, which is included in all notification messages: Backup status at mm_dd_yyyy_hh.mm.ss] from machine_name By default, SnapManager for Exchange is used for the appended subject string.

Step	Action
4	If you want to send the report as an attachment or in verbose mode, click Advanced and select the appropriate options as follows, then click OK: ◆ Send operation results summary (default) If you select this option, only the last error or OK string is sent in the body of the e-mail. You can optionally have the verbose operation results included as an attachment by selecting the Include SnapManager Operation Report as an Attachment option. ◆ Send verbose operations results If you select this option, the entire status report is sent in the body of the e-mail. 

Step	Action
5	Click Apply to commit your settings. 
6	Click Send a Test E-mail to test the e-mail notification process. Result: SnapManager sends the e-mail notification, using the settings you specified.

Configuring filer SysLog and Autosupport

About filer Syslog and Autosupport

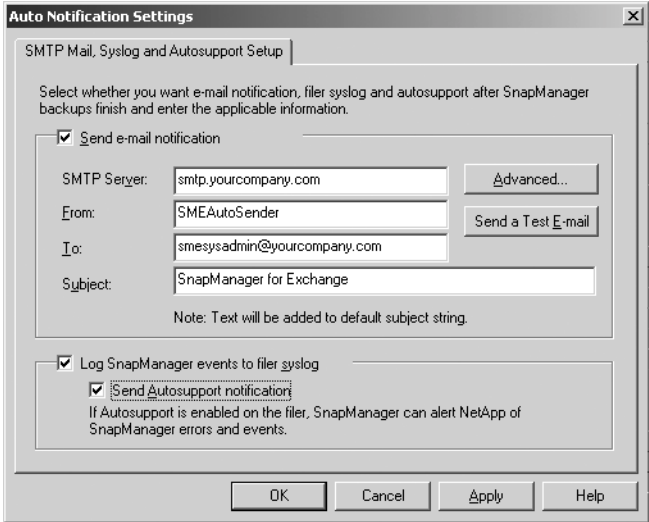
If Autosupport is enabled on the filer, NetApp Technical Support is notified automatically by e-mail about filer problems when they occur. You can use the Filer Autosupport tab to enable Autosupport for SnapManager and to enable filer Syslog support.

The `autosupport` daemon monitors the filer's operations and sends automatic messages to NetApp Technical Support to alert them to potential filer problems. If necessary, NetApp Technical Support contacts you at the e-mail address that you specified to help resolve a potential system problem. The `autosupport` daemon is enabled by default on the filer.

For more information about Autosupport, see the *System Administration Storage Management Guide* for your version of Data ONTAP.

Configuring Syslog and Autosupport notification

To enable and configure Syslog and Autosupport notification, complete the following steps.

Step	Action
1	Select Options > Notification Setting from the SnapManager main menu. Result: The Auto Notification Settings window is displayed. 
2	To use both the SnapManager Autosupport and syslog features, select both the Log SnapManager Events to Filer Syslog and Send Autosupport Notification check boxes. Note_____ Autosupport must be enabled on the filer to use this feature. _____
3	Click OK to save your settings.

Glossary

backup set	A <i>SnapManager backup set</i> , often referred to as a backup set, is the complete set of data required to form a restorable backup or archive: all Exchange data snapshots, all transaction log snapshots, and the SnapInfo directory.
Directory Store	A logical entity for Exchange 5.5 containing the user directory information. Replaced by Active Directory entries for Exchange 2000.
Exchange	In this guide, the term <i>Exchange</i> is used to describe Microsoft Exchange 2000, Microsoft Exchange 2003, or Microsoft Exchange 5.5. Information about a particular version of Exchange will be labeled with the Exchange version number or numbers.
Exchange environment	The Exchange organization and the supporting Windows server environment.
Exchange organization	The entire Exchange deployment (all of the Exchange servers).
file system	The native Windows file system supported by SnapManager using NTFS.
filer	Any NetApp storage appliances running the Data ONTAP operating system, including F-series filers, NearStore systems, and FAS appliances.
Information Store	A logical entity for Exchange 5.5 containing the public and private databases. Corresponds with a storage group in Exchange 2000.

LUN (Logical Unit Number)	A logical unit of storage that can be managed by SnapDrive in a SAN environment. Within the Windows operating system, LUNs appear as locally attached disks. The terms “LUN” and “virtual disk” are synonymous; this manual uses the term “LUN”.
SFSR	Single File Snap Restore. An SFSR reverts a single file to the version of that file contained in a particular snapshot. After a file has been restored using SFSR, all user-visible information (data and file attributes) for that file in the active file system are identical to the state contained in the snapshot. SnapManager uses SFSR to restore a LUN to its state when a SnapManager backup was taken.
snapshot	An online, read-only copy of a volume. For more information about snapshots, see “ SnapManager and snapshots ” on page 9.
storage group	This Microsoft concept refers to a group of one to five databases (information stores) and an associated set of transaction log files, all of which are mounted on the same Exchange server. This concept was introduced in Exchange 2000; for Exchange 5.5, the Information Store and Database Store can be thought of as storage groups.
storage group set	One or more Exchange storage groups that belong to the same Exchange server and are stored on the same filer volume. Storage groups in the same storage group set are displayed in the same color and are all automatically preselected when one is selected to be backed up.
virtual disk (LUN)	A logical unit of storage that can be managed by SnapDrive in a SAN environment. Within the Windows operating system, LUNs appear as locally attached disks.
volume	A logical unit of data storage on a filer.
Windows Server environment	A group of Windows servers providing basic services such as Active Directory, DNS, DHCP, and so on. Sometimes also referred to as a <i>Windows environment</i> .

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